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1909/10

New York State College of Agriculture

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PRESIDENT'S OFFICE.

PROGRAM OF  
COURSES OF INSTRUCTION

FOR THE

ACADEMIC YEAR

1909-1910

ITHACA, NEW YORK  
PUBLISHED BY THE UNIVERSITY  
MAY, 1909

## CALENDAR OF CORNELL UNIVERSITY AND OF THE COLLEGE OF AGRICULTURE.

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1909-1910.

### First Term.

- Sept. 20, Monday, University entrance examinations begin.  
Sept. 28, Tuesday, ACADEMIC YEAR BEGINS. MATRICULATION of new students.  
University Scholarship examinations begin.  
Sept. 29, Wednesday, MATRICULATION of new students.  
*Special students, old or new, must first present themselves at the  
Secretary's Office, Main 122.*  
Sept. 30, Thursday, REGISTRATION of matriculated students.  
Oct. 1, Friday, INSTRUCTION BEGINS in all the departments of the University  
at Ithaca. President's annual address to the students, 12:00 M.  
Nov. 25, THANKSGIVING DAY.  
Dec. 2, Thursday, REGISTRATION for the Winter-courses, beginning at 8:30  
A. M. in the Auditorium.  
Dec. 3, Friday, 8 A. M., Instruction begins in Winter-courses.  
Dec. 23, Thursday, Christmas recess for regular and special students.  
Jan. 5, Wednesday, Instruction resumed.  
Jan. 11, Tuesday, FOUNDER'S DAY.  
Jan. 26, Wednesday, First term closes.

### Second Term.

- Jan. 29, Saturday, REGISTRATION for second term.  
Feb. 22, (week of) Meeting of Experimenter's League. Farmer's Week.  
Feb. 22, Tuesday, WASHINGTON'S BIRTHDAY.  
Feb. 23, Wednesday, Close of Winter-courses.  
March 24, Thursday, Instruction ends.  
April 5, Tuesday, Instruction resumed.  
April 15, Friday, Latest date for receiving applications for Fellowships and  
Graduate Scholarships.  
May 30, Monday, DECORATION DAY.  
June 19, Sunday, Baccalaureate Sermon.  
June 21, Tuesday, Class Day.  
June 22, Wednesday, Alumni Day and Annual Meeting of the Trustees.  
June 23, Thursday, FORTY-SECOND ANNUAL COMMENCEMENT.

### Summer Session.

1910.

- July 5, Tuesday, Summer Session begins.  
Aug. 12, Friday, Summer Session ends.

**New York State College of Agriculture** <sup>PRESIDENT'S OFFICE</sup>

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**THE AGRICULTURAL COLLEGE AND EXPERIMENT  
STATION COUNCIL.**

JACOB GOULD SCHURMAN, President of the University.  
ROBERT H. TREMAN, Trustee of the University.  
LIBERTY H. BAILEY, Director of the College of Agriculture.  
EMMONS L. WILLIAMS, Treasurer of the University.  
JOHN H. COMSTOCK, Professor of Entomology.  
HENRY H. WING, Professor of Animal Husbandry.

**Faculty.**

JACOB GOULD SCHURMAN, A.M., D.Sc., L.L.D., President of the University.  
LIBERTY HYDE BAILEY, M.S., L.L.D., Director of the College of Agriculture, and Dean of the Faculty.  
ISAAC PHILLIPS ROBERTS, M.Ag., Professor of Agriculture, Emeritus.  
JOHN HENRY COMSTOCK, B.S., Professor of Entomology and Invertebrate Zoology.  
HENRY HIRAM WING, M.S., in Agr., Professor of Animal Husbandry.  
JOHN CRAIG, M.S., in Agr., Professor of Horticulture.  
THOMAS LYTTLETON LYON, Ph.D., Professor of Soil Technology.  
HERBERT JOHN WEBBER, M.A., Ph.D., Professor of Plant-Breeding, and Acting Director.  
JOHN LEMUEL STONE, B.Agr., Professor of Farm Practice.  
JAMES EDWARD RICE, B.S.A., Professor of Poultry Husbandry.  
BENJAMIN MINGE DUGGAR, M.S., Ph.D., Professor of Plant Physiology.  
GEORGE WALTER CAVANAUGH, B.S., Professor of Chemistry in Its Relations with Agriculture.  
GEORGE NIEMAN LAUMAN, B.S.A., Professor of Rural Economy.  
HERBERT HICE WHETZEL, A.B., M.A., Professor of Plant Pathology.  
ELMER O. FIPPIN, B.S.A., Professor of Soil Technology.

- GEORGE FREDERICK WARREN, Ph.D., Professor of Farm Management and Farm Crops.
- WILLIAM ALONZO STOCKING, JR., M.S.A., Professor of Dairy Industry.
- ALEXANDER DYER MacGILLIVRAY, Ph.D., Assistant Professor of Entomology and Invertebrate Zoology.
- WILLIAM ALBERT RILEY, Ph.D., Assistant Professor of Entomology.
- JAMES GEORGE NEEDHAM, Ph.D., Assistant Professor of Limnology and General Biology.
- LOWELL BYRNS JUDSON, A.B., B.S., Assistant Professor of Horticulture.
- CHARLES SCOON WILSON, A.B., M.S.A., Assistant Professor of Pomology.
- MERRITT WESLEY HARPER, M.S., Assistant Professor of Animal Husbandry.
- BRYANT FLEMING, B.S.A., Assistant Professor of Rural Art.
- WILLIAM CHARLES BAKER, B.S.A., Assistant Professor of Drawing.
- CHARLES HENRY TUCK, A.B., Assistant Professor of Extension Teaching.
- CHARLES ALBERT PUBLOW, M.D., Assistant Professor of Dairy Industry.
- JAMES ADRIAN BIZZELL, Ph.D., Assistant Professor of Soil Technology.
- CLARENCE ARTHUR ROGERS, M.S.A., Assistant Professor of Poultry Husbandry.
- PAUL J. WHITE, A.B., M.S.A., Ph.D., Assistant Professor of Farm Crops.
- GLENN WASHINGTON HERRICK, B.S.A., Assistant Professor of Economic Entomology.
- HOWARD WAIT RILEY, M.E., Assistant Professor of Farm Mechanics.
- CYRUS RICHARD CROSBY, A.B., Assistant Professor of Entomological Investigations.
- HAROLD ELLIS ROSS, B.S.A., M.S.A., Assistant Professor of Dairy Industry.
- DONALD REDDICK, A.B., Ph.D., Assistant Professor of Plant Pathology.
- HARRY HOUSER LOVE, Ph.D., Assistant Professor of Plant-Breeding Investigations.
- ARTHUR WITTER GILBERT, Ph.D., Assistant Professor of Plant-Breeding.

ALBERT RUSSELL MANN, B.S.A., Secretary to the College of Agriculture.

CHARLES FREDERICK CLARK, Ph.D., Assistant Plant-Breeder in the Experiment Station.

CHARLES CLEVELAND HEDGES, A.B., Instructor in Agricultural Chemistry.

LEWIS KNUDSON, B.S.A., Instructor in Plant Physiology.

GEORGE ARTHUR CRABB, B.S.A., Instructor in Soil Technology

EDWARD RUSSEL MINNS, B.S.A., Instructor in Farm Practice and Assistant Superintendent of the University Farms.

LEON DEXTER BATCHELOR, B.S., Instructor in Horticulture.

GEORGE WALTER TAILBY, Jr., B.S.A., Instructor in Animal Husbandry, and Stockman.

ELMER SETH SAVAGE, B.S.A., M.S.A., Instructor in Animal Husbandry.

MINNIE JENKINS, B.S.A., M.S.A., Instructor in Dairy Industry.

LEWIS JOSEPHUS CROSS, B.A., Instructor in Agricultural Chemistry.

GEORGE E. BURNAP, B.S., Instructor in Rural Art.

MILTON PRATT JONES, B.S.A., Instructor in Extension Teaching.

EDWARD SEWALL GUTHRIE, B.S.A., Instructor in Dairy Industry.

KENNETH CARTER LIVERMORE, B.S.A., Instructor in Farm Crops.

#### **Other Officers of Instruction and Administration.**

ALICE GERTRUDE McCLOSKEY, A.B., Lecturer in Nature-Study.

MARTHA VAN RENSSELAER, A.B., Lecturer in Home Economics.

ANNA BOTSFORD COMSTOCK, B.S., Lecturer in Nature-Study.

WILFORD MURRAY WILSON, M.D., Lecturer in Meteorology (detailed by Weather Bureau, United States Department of Agriculture).

FLORA ROSE, B.S., M.A., Lecturer in Home Economics.

JOHN WALTON SPENCER, Agent in Extension Work.

HUGH CHARLES TROY, B.S.A., Assistant in Dairy Laboratory.

WALTER WAGER HALL, Assistant in Cheese-Making.

WEBSTER EVERETT GRIFFITH, Assistant in Butter-Making.

HARVEY LYON AYRES, Superintendent of Dairy Manufactures.

CHARLES HERBERT VAN AUKEN, Assistant in Animal Husbandry.

ADA ELJIVA GEORGIA, Assistant in Nature-Study.

CLARA NIXON, Assistant in Poultry Husbandry.

LEONARD HASEMAN, A.M., Assistant in Entomology.

MORRIS MICKEY McCOOL, B.S.A., Assistant in Plant Physiology.

MORTIER FRANKLIN BARRUS, A.B., Assistant in Plant Pathology.

EUGENE PETER HUMBERT, M.S.A., Assistant in Plant-Breeding.

HAROLD JOEL CONN, B.S., Assistant in Soil Technology.

ROBERT MATHESON, M.S., in Agr., Assistant in Entomology.

ANNA CLEGG STRYKE, A.B., Assistant in Entomology.

WALTER STANLEY LYON, Assistant in Poultry Investigations.

ALEXANDER THOMAS MOIR, Assistant in Poultry Husbandry.

LEE BRIGGS COOK, B.S.A., Assistant in Dairy Industry.

FRANKLIN STEWART HARRIS, B.S., Assistant in Soil Technology.

GEORGE WALTER TAILBY, Foreman of the Farms.

CHARLES EDWARD HUNN, Gardener.

HENRY JACKSON MOORE, Gardener to the Horticultural Department.

WALTER GARNET KRUM, Superintendent of Poultry Department.

ANDREW JACKSON LAMOUREUX, Librarian.

HERBERT W. TEETER, Superintendent of Plant-Breeding Garden.

EDWIN S. De LANY, Clerk.

GILBERT ARTHUR RENNEY, Superintendent of Mailing-Rooms.



## THE COLLEGE OF AGRICULTURE.

By act of the Legislature of the State of New York, approved May 9, 1904, an appropriation of \$250,000 was made for buildings for the College of Agriculture; and the act authorized Cornell University to purchase the dairy building erected by the State some years ago, and to add the purchase price (\$40,000) to the appropriation, thereby making a building fund of \$290,000. The act also established the College as "The New York State College of Agriculture at Cornell University." These buildings were first occupied in June, 1907. They consist of a group of three connected by covered loggias, and a detached building occupied by the Department of Animal Husbandry. The main group of buildings, with a frontage to the south of 484 feet, occupies a site to the east of the original University campus, with commanding views in all directions. All the buildings are built of brick of various sizes and colors. The Main building, central in the group of three, contains in the basement mailing and storage rooms for the publications of the College, a large lavatory with baths, lockers, an extension office, Cornell Countryman office, and laboratories and store-rooms for horticultural and other work. The heating plant for the buildings is beneath this basement. A completely inclosed passageway leads to the basement of the Dairy building on the east and to the Agronomy building on the west.

The first floor of the Main building contains the offices of administration, including the office of the Director and Secretary, and the business office, to the west of the main entrance. To the east are the office for extension teaching, the library and two seminary rooms, and the office of the Department of Rural Economy. Between these two groups of rooms is the auditorium, seating about six hundred on the main floor and the two balconies. The loggias on this floor are open at the sides, but covered above.

The second floor is occupied by the Department of Horticulture, with its lecture rooms and two laboratories, and offices for the staff; also two rooms for women's rest room and lavatory.

The Department of Entomology and General Invertebrate Zoology occupies the third floor with its museum at the head of the stairway and the offices of the staff immediately beyond. The provisions for light in the laboratories are worthy of note. The lecture room will accommodate one hundred and sixty. Quarters are provided for the work in limnology.

In the center of the fourth floor is a suite of rooms occupied by

the Central Station, New York Section, of the Weather Bureau of the United States Department of Agriculture. To the west are Nature Study and Home Economics offices, and to the east the laboratories of the Home Economics Department and a suite of dark rooms.

The Dairy building to the east of the Main building and connected with it by passageways, on three floors is in two sections. The three-story part contains in the basement locker-rooms and lavatory with bath, rooms for instruction and practice in dairy mechanics, and a steam laundry. The main floor contains the general offices of the Department and the large laboratories for dairy bacteriology with the necessary incubator-room. A special reading-room, which also serves in part as a museum, is provided. On the second floor is the large lecture-room seating 250, with its preparation-room, and a smaller lecture-room. The large milk-testing laboratory is also provided with a preparation-room. The attic houses the drawing required in the various courses of the College. Connected with this building is the section containing the manufacturing-rooms. The milk-receiving room is at the far end and connects with the separator-room and the cheese-making room as well as with a can-cleaning room. Between the separator-room and the churn-room is the cream-ripening room and the refrigerator for butter. Beyond the cheese-making room is a series of three curing-rooms, the starter-room and a room for farm-dairy practice. Adjoining the main dairy building are the rooms for market-milk handling, including a receiving room, bottling room, sterilizing and refrigerating rooms, and a bottle wash-room: and below these in the basement are large storage and refrigerator-rooms. On the same side as the rooms for cheese-making and in the basement, are the rooms for making fancy cheese, with additional curing-rooms and a room for casein-making. A boiler and engine-room with the necessary storage, complete the general features of the Dairy building.

To the west of the Main building and connected with it, as is the Dairy building, by passageways, on three floors, is the Agronomy building. The basement is devoted to instruction in Farm Mechanics and in Soil Technology. The first floor contains a number of offices and the laboratory for Plant Physiology, while the feature of the second floor is the large laboratory for the study of Farm Crops. The Experiment Station also has a large laboratory for the study of the problems of fertility. The top floor houses the work in Plant Pathology, and the Experimental Plant-Breeding of the Experiment Station.



Detached from the main group of buildings to the northeast is the building for the Department of Animal Husbandry, with its large judging pavilion, offices, library, lecture and laboratory rooms.

To the west of the Agronomy building is a rural school house of modern design, and a school-garden. Here an elementary school is maintained.

In the rear of the Main building is the University barn and the Poultry Department. The new barns provided by act of the Legislature are now under construction on the farms to the eastward.

The present glass-houses are now being replaced by a much larger range located just east of the agricultural group, the sum of \$30,000 being available for this purpose.

The farms and experimental plats, comprising about 638 acres, are adjacent.

The Agricultural Experiment Station is a department of the New York State College of Agriculture. Incidentally, students may acquire instruction from observing and discussing the experiments that are being conducted.

The publications of the Agricultural Experiment Station include to date twenty-one annual reports and two hundred and sixty-seven bulletins. These publications are distributed free to such residents of the State as apply for them, so far as the means of the Station will permit and as they are available.

## EQUIPMENT OF THE DEPARTMENTS.

### *Agricultural Chemistry.*

The instruction in Agricultural Chemistry is given in Morse Hall, the Department of Chemistry. Here ample facilities are provided for laboratory work, which is made an important part of the instruction. The laboratories are well lighted and provided with gas, electric light, distilled water, and compressed air. Each student is provided with a complete set of apparatus for quantitative analysis. The work is arranged to familiarize the student with the composition and properties of the more important agricultural chemicals.

For the advanced courses there is a special laboratory accommodating twenty-four students.

The lecture rooms are provided with electric projection lanterns that allow the use of lantern slides for illustrating the lectures, and they have large well-equipped lecture tables. There are also a chemical museum and reading-room, and the general facilities of a well-equipped chemical department.

*Soil Technology.*

The courses in Soil Technology are designed to give the student in general agriculture an understanding of the fundamental principles of the management of soils for crop production, and to afford opportunity for special study in particularly important fields of the subject. The former group includes a study of the processes of soil formation and classification, the physical and chemical properties and the modification of the soil by cultural operations. It is a summary of the general field of soil knowledge. In the latter group, particular phases of the subject are taken up for advanced study, as detailed in the courses of instruction.

The lectures are illustrated by lantern slides and demonstrations, and the laboratory is equipped to accommodate 128 students. This equipment includes the most modern apparatus for the study of the physical constitution of the soil, its capacity for retention and movement of water, for the circulation of air, relation to heat, amount and effects of organic matter and other important physical and chemical properties. Each student has the use of desks and lockers, containing a stock equipment, and of balances, microscopes, thermometers, mechanical analysis outfits, aspirators, and so on.

Large quantities of a number of type samples of soil are provided for study, and in addition there is a large collection of samples of important type soils from all parts of the United States for examination and comparison. The study of the soils of the United States is supplemented by detailed soil maps of all areas surveyed to date.

The great variety of soils and soil conditions in the vicinity of Ithaca is made use of for field excursions to study their classification, occurrence and treatment. All necessary equipment for the preparation of farm soil maps is provided. A large collection of soil-working implements is available for study with reference to their lines of construction for efficiency of operation in soils of different character and condition.

For special advanced study and investigation along the lines that have been mentioned, special apparatus and facilities are available, according to the subject.

*Plant Physiology.*

The instructional work and the equipment in Plant Physiology is designed, aside from the principles of scientific training, to meet fundamental and practical needs of,—

1. Students who go into general agriculture or farm work.
2. Students whose subsequent work in the various lines of plant industry, teaching or investigation may be so specialized as

to require some detailed scientific training, particularly in such phases of the work as plant nutrition, the relation of plants to climatological factors, the course of bacterial and other fermentation, cell physiology and heredity.

Instruction in Plant Physiology is not confined to laboratory studies and class demonstrations, but ample opportunities will be afforded, upon the completion of the new greenhouses, for class work and for individual investigation. Moreover, the University farms and grounds will supply, for those who can devote the summer to their investigations, a variety of crops and ornamental plants needed for particular observation and experiments.

### *Farm Management and Farm Crops.*

Instruction in Farm Crops is given by means of lectures, recitations and field and indoor laboratory work. The Department is provided with a lecture room and large, well-lighted laboratory. The latter is equipped with specially designed desks for 92 students, with gas and water and ample locker space. Farm crop materials are procured for use in indoor laboratory work. Bulletins of the various experiment stations constitute a part of the laboratory equipment. The farms and experimental plots are used for laboratory work in the field. Farms adjacent to Ithaca furnish laboratory materials for the study of Farm Management. Ithaca is specially favorably situated for the study of Farm Management, because there is a great diversity of farm conditions. Some of the best and some of the poorest farms of the State are within easy reach of Ithaca. Excursions are also made to a few farms in other parts of the State for the study of Field Crops and Farm Management.

### *Horticulture.*

The equipment is divided into two parts,—that which is associated with the class-rooms and laboratories on the second and basement floors of the Main agricultural building, and that connected with the forcing-houses and grounds surrounding them.

1. Class-rooms and laboratories. Lectures and a major portion of the laboratory work are given in the headquarters of the Department, which occupy the entire second floor of the Main building of the agricultural group. On this first floor are commodious lecture rooms, laboratories and offices.

The larger lecture room is provided with a stereopticon, and has a seating capacity of 120; the smaller seats 35, besides accom-

modating the Department garden herbarium. One laboratory is devoted to practical and systematic pomology, floriculture and olericulture, and is equipped in the most approved manner for the efficient teaching of the practical and laboratory phases of horticultural work. It accommodates 40 students. The other laboratory is devoted to the use of advanced students, where those who are working in the graduate department or engaged in research courses are provided with suitable appliances for their special needs. Space is afforded in this for 20 students. The remainder of the floor is devoted to museum purposes and offices for the instructing staff. Large display cases lining the corridor are filled with horticultural specimens, tools and appliances.

In the basement is a laboratory for practical work in nursery problems and elementary Pomology. The capacity of this laboratory is 50 students, so that a beginning class of 100 may be accommodated in two sections.

2. Forcing-houses and orchards. New glass structures for the study of forcing-crops, such as flowers, vegetables, and fruits, covering an area of about 7,000 square feet, are in course of construction and will be used in connection with nearly all classes, though more especially associated with floriculture and olericulture. One house is assigned to advanced students for the working out of problems on which they are engaged, and another is given over to the study of the variation of plants and the technique of plant-breeding.

The collection of spray machinery, including gas engines, traction machines, and the like, is full and complete, permitting thorough instruction in the control of orchard enemies.

The land equipment comprises the vegetable gardens near the campus, and fifty acres of land on the University farm now partly planted and in process of development. These are furnishing excellent demonstration material for lecture and laboratory.

Aside from ordinary equipment, the garden herbarium, with more than 12,000 sheets, is an important aid in the study of systematic pomology and plant variation. There is also an exceptionally fine collection of nearly 10,000 negatives illustrating all phases of fruit, flower, and vegetable growing. This collection is being added to continually, and furnishes a useful source for lantern slides to illustrate up-to-date methods in the management of fruit plantations, the construction of forcing-houses, and the growing of vegetables and flowers in field and under glass. The department has a collection of 2,000 lantern slides, to which additions are constantly being made.



*Plant Pathology.*

The Department of Plant Pathology, organized in 1907, is housed in the south end of the top floor of the Agronomy building. The equipment consists of a large elementary laboratory, an advanced laboratory, work room, culture room, and offices including small research rooms for graduate and advanced students. The equipment of the Department, which is new throughout, includes furniture especially built for the particular work of the Department, an up-to-date and complete equipment of microscopes, microtomes, sterilizers, electric incubators, etc., for the teaching and investigation work. There are also a rapidly growing plant pathology herbarium, photographs, a department library, etc. The Department is now in a position to offer facilities for practically every line of work included within its field. It is expected also that land and greenhouse facilities will very shortly be available for demonstration and experimental work as well as for teaching purposes.

*Farm Mechanics.*

This Department is housed in the north end of the basement of the Agronomy building. The equipment includes a traction engine piped to the steam mains for convenience in laboratory study, three small gasoline engines, two hot air engines, several pumps, hydraulic rams, a windmill, threshing machine complete with all modern improvements, plows, harrows, cultivators, planters, harvesters, and a large number of other agricultural implements which because of their bulk are stored in the barns of the college. Among a number of implements and models of historic value, special note should be made of the copies of the Rau plow models obtained by ex-President A. D. White in Germany in 1868. A number of pieces of special apparatus have been designed and constructed as required, of which the most important is a "Sprayograph" for testing spray nozzles.

For the work in farm engineering, the equipment consists of two very good surveyor's transits, eight farm levels, measuring tapes, leveling rods, ranging poles, axes, etc.

*Entomology.*

The entomological laboratories are well equipped for work in any phase of the subject. There is a good supply of microscopes and accessories, including equipment for photo-micrographic work. In addition there is a very full outfit for work in insect photography. Ample facilities in the line of microtomes, paraffin ovens, and



reagents are provided for work in insect morphology and embryology, and an extensive collection of prepared slides is at the disposal of students working in these subjects.

The insect collections have been developed as an adjunct to the work of instruction and are especially rich in biological and illustrative material. In addition to many exotic species, they contain specimens of a large part of the more common species of the United States. These have been determined by specialists and are accessible for comparison.

The lecture room equipment consists of a synoptic collection of insects, sets of the Lueckart and the Pfurtscheller diagrams, models, projection lanterns, and a complete outfit for the projection of microscopic objects.

Adjacent to the laboratories is an insectary which, together with the insectary of the Agricultural Experiment Station, affords exceptional opportunities to advanced students for special investigation in the study of life histories, and for experiments in applied entomology.

For studies of the life histories, biology, and economic importance of aquatic forms, unrivalled facilities are afforded by the field laboratory, located in the midst of the Renwick marshes and fully provided with breeding cages, running water, and aquaria, in addition to the natural facilities.

### *Animal Husbandry.*

The equipment in this Department available for purposes of instruction is as follows:

1. The College herds and flocks. Of cattle a herd of about 75 head is maintained, which will shortly be increased to more than 100. Aside from about a car-load of steers fed for market each year, the herd is essentially a dairy herd and to a large extent has been bred and developed by the College itself. It at present contains representative specimens of Holsteins, Jerseys, Guernseys, and Shorthorns.

A flock of about 50 sheep includes representative specimens of Dorsets, Shropshires, Hampshires, Southdowns, Delaines, Rambouillets, and Cheviots, and is kept mainly for the production of winter or hothouse lambs. About 10 brood sows of the Cheshire breed—"The New York Farmer's Hog"—are kept to utilize waste dairy products and to illustrate a profitable early maturing butcher's hog of a semi-bacon type.

2. Herd- and flock-books. The library of herd- and flock-books is large and complete, comprising more than 1,000 volumes and

including complete sets of all the more important breeds and many of the lesser ones.

A fairly complete collection of lantern slides illustrating breed types and skeletons of the horse and ox add to the material available for class room purposes.

The Animal Husbandry building, detached from the main group, but adjacent, is 60 x 90 feet in size.

### *Poultry Husbandry.*

The Department of Poultry Husbandry is located north of and near to the new Agricultural College buildings. The area occupied is about four acres. The buildings consist of a main building 30 x 46 feet, and houses providing seventy pens for the accommodation of about fifteen hundred fowls. These houses include fourteen New York State gasoline-heated colony brooder houses and several summer houses for rearing twenty-five hundred or more chickens annually, and a new laying house 276 feet long containing twenty-three pens. The main building contains an incubator cellar 30 x 30 feet, an egg room, killing room, carpenter shop, lockers for fifty students, and a dormitory, laboratory and museum.

The lecture and recitation courses, laboratory, seminar, systematic reading and drawing courses are all given in the Dairy building. In this building also are located the department office and reading room.

Instruction is divided about equally between lectures, recitations, text-book study and required reading, and the practice courses:

1. Lectures. For the lecture course there are a large number of charts and models, about 575 lantern slides and 1,365 negatives with blue prints relating to poultry.

2. Systematic reading. Students have easy access to the Agricultural College and Experiment Station library and reading-room. In addition to this there are the poultry alcove in the University Library and the poultry reading-room (in the Dairy building), where the principal poultry books and fifty-four poultry papers are on file. There is also a large card subject index of poultry literature.

3. Laboratory, shop, plant and field practice. These four types of practice work are given afternoons to supplement the lectures and recitations. For the shop work there is a good collection of carpenter's tools.

For the laboratory and field practice, several sets of caponizing instruments of different makes, anatomical and drawing instruments, model of a turkey and of an egg during incubation, a

collection of eggs of nearly all the varieties of poultry, microscopes, camera, balances and scales, models of poultry buildings and trap nests, twenty-five enlargements of various varieties of poultry from the American Standard of Perfection, killing instruments, a collection of packages for marketing poultry products and samples of forty kinds of poultry feeds are available.

4. Feeding and management practice. For this course twenty-eight pens, containing from 15 to 30 fowls each of ten leading varieties of fowls and four varieties of ducks, are used. There is a fattening house, 12 x 30 feet, fitted with suitable appliances. Record sheets are supplied by which the student shows at the end of the course a complete history of the method of feeding and care, value of production, profit and loss, etc. Fattening crates and three styles of cramming machines are provided; also five makes of bone cutters, including a large power cutter, six horse-power gasoline engine, power feed mill, clover cutter and root slicer.

5. Incubator practice. For the course in incubator practice there are 30 incubators, including several of each of the leading machines and one or more of a large number of makes sent here for student inspection and use. The incubator cellar is provided with electric lights for reading the thermometers and testing the eggs. Record sheets are supplied which show the method of operation of the machine each day. There are hygrometers and thermographs for moisture and temperature readings.

6. Brooder practice. A pipe-system brooder house, 45 feet long x 12 feet wide, five types of brooders, including the gasoline-heated colony brooders and a gasoline storage tank, are used.

### *Dairy Industry.*

The Department of Dairy Industry occupies the building east of the Main agricultural building. A covered loggia connects the two buildings. The class rooms, bacteriology and testing laboratories, locker-rooms (with shower bath), reading-room, offices and dairy mechanic rooms occupy a part of the building which is 50 x 100 feet in size, and three stories high. All manufacturing work is conducted in the remaining part of the building, which is 60 x 160 feet in size, and one story high, with basement under part of it. The manufacturing part of the building is planned and equipped to make it thoroughly sanitary and well adapted for instruction and for commercial work. In the winter about 6000 pounds of milk are handled daily, and in the summer the milk received at the Dairy building and the cream received from three skimming-stations represent about 25,000 pounds of milk daily. The skimming-stations are located at

short distances north of Ithaca and are equipped and conducted as are stations operated exclusively for commercial purposes.

Instruction is given by lectures and recitations in class rooms, and supplemented by practice in laboratories and manufacturing rooms. The practice is of seven kinds:

1. Testing milk and milk products for their richness and purity. The testing laboratory is equipped with 200 lockers for students, the leading styles of turbine and hand centrifugal Babcock testers and one Gerber tester, also lactometers and all necessary glassware.

2. Dairy bacteriology. This division is provided with two large and well-lighted laboratories, individual desks and lockers for students, a full line of equipment for making media, hot air and steam sterilizers, incubators for maintaining constant temperatures, high-speed centrifuge for determining dirt and bacterial content of milk, high-power microscopes, and all glassware and apparatus necessary for bacteriological work.

3. Butter-making. This work is conducted in several different rooms. The farm dairy room contains leading styles of hand-power separators and churns, and various kinds of apparatus used in a dairy where butter is made in small quantities. Creamery methods are taught chiefly in a large separator-room, provided with several types of power separators, milk heaters and pasteurizers, and in a churning-room which contains several different kinds of power churns and workers. There are special rooms for making starters, ripening cream, and holding butter in cold storage. There is also a boiler room with 30 horse-power boiler, engine and necessary pumps.

4. Cheddar cheese-making. The room for this work is equipped with one large vat and eight smaller ones, one horizontal continuous pressure press, one upright press, hoops for making cheese in three sizes, also rennet tests, curd mills, and other small apparatus. Four insulated curing-rooms adjoin the manufacturing room.

The milk-receiving room and can-washing room are located convenient to the creamery and cheese-rooms. These are provided with scales, composite sample outfit, and a power can-washer and rinser.

5. Fancy cheese-making. Making and curing-rooms and necessary equipment are provided for the manufacture of a few varieties of so-called fancy cheese. The varieties to be made will be increased in number as rapidly as possible.

6. Market-milk handling. For this work there are three rooms besides a special refrigerator and receiving-room. In their arrangement, the principles governing the proper management of any commercial sanitary milk plant have been considered. The equipment includes a rotary washer, rinser, steam chest sterilizer and approved



bottle-filling apparatus. The college operates a market milk route for the disposal of milk produced by the college herd, and all records are kept in the same manner as might obtain with any commercial concern.

7. Dairy mechanics. This instruction is given in two rooms in the basement. The equipment includes a steam engine, a gasoline engine, shafting, various sizes of pulleys, belts, different types of separators, and tools for pipe-fitting and soldering and plain carpenter work,—a list of tools similar to and somewhat larger than would be found in many well-conducted dairy manufacturing plants.

A deposit is required to cover the value of apparatus loaned to students. When the apparatus is returned in good order, the deposit is returned less a charge of 25 cents, to apply on losses of general equipment. Clean, white over-all suits are required for all practice work in this department. Lockers for these suits, as well as for equipment used by individual students in the laboratories, are provided without charge.

### *Home Economics.*

In recognition of a growing need for scientific instruction in the subjects most closely related to the welfare of the home and the family, a Department of Home Economics was established in the College of Agriculture in the fall of 1907. The quarters of this department are on the fourth floor of the Main building of the College and consist of departmental offices, a class room, a library, and a new, well-equipped laboratory. The laboratory includes many of the modern labor-saving devices deemed practicable for the home, and it affords the student an excellent opportunity for original research.

### **EXPENSES, FELLOWSHIP, SCHOLARSHIPS AND PRIZES.**

Tuition is free to regular and special students in the College of Agriculture.

Fees are as follows:

|                    |        |
|--------------------|--------|
| Matriculation..... | \$5 00 |
|--------------------|--------|

#### *Degrees.*

|                    |       |
|--------------------|-------|
| Baccalaureate..... | 10 00 |
| Advanced.....      | 20 00 |

#### *Incidentals.*

|  |      |
|--|------|
| Post-graduate fee, each term.....                  | 7 50 |
| Regular students, 3d and 4th years, each term..... | 7 50 |
| Specials, each term.....                           | 7 50 |
| Infirmary fee, each term.....                      | 2 00 |



*Other deposit fees are required in various laboratory courses, about which students should inquire before registering, and attention is called to the expenses of excursions required in various courses.*

The expense of text-books, instruments, etc., varies from \$10 to \$75 per annum.

The cost of living in Ithaca, including board, room, heat and lights, varies from \$5.50 to \$10 per week.

A fair estimate of the yearly expenses is from \$300 to \$500, but much depends on the personal tastes of the student.

The cost of board, rent of furnished room, fuel and lights, in Sage College or Sage Cottage, which are exclusively for women, varies from \$225 to \$300 per year. Both buildings are warmed by steam, lighted by electricity, and, in most cases, the sleeping apartment is separated from the study. The responsibility for the conduct of the students living in Sage College and the Cottage rests with the Adviser of Women in the University. Inquiry regarding board and rooms at the Sage College and the Cottage should be addressed to Mr. G. F. Foote, Business Manager of Sage College, Ithaca, N. Y.

There is a limited amount of work on the farms that will be given to students who apply for it. Those desiring work should write early to Professor J. L. Stone, who will furnish application blanks.

### **Scholarships and Fellowship in Agriculture.**

#### *For Regular and Special Students.*

The Roberts scholarship fund, a gift of the late Dr. Charles H. Roberts of Oakes, Ulster County, N. Y., October 17th, 1906, provides five scholarships each tenable for one year. As expressed by the founder, the purpose of these scholarships is to furnish financial assistance to students in the College of Agriculture who are of good moral character, who show native ability, tact and application, and who are in need of such assistance, and especially those who come from rural districts. The award is made after the end of the first term of each year. Application blanks and copies of the regulations may be had at the office of the Secretary of the College of Agriculture. All applications must be on the official blanks which, with all other information, must be filed before February 1, 1910. The value of each scholarship is \$240.

A fellowship worth \$500 is awarded to the College of Agriculture and the Veterinary College combined.

#### *For Winter-Course Students.*

At its annual meeting, held February, 1909, the New York State Grange adopted a resolution whereby \$300 is to be given to members

of the Order in the form of six scholarships in the winter-courses in agriculture in Cornell University. The scholarships are each of a value of \$50, to be awarded to men or women who attain the highest standing in competitive examination. The candidate should apply to the Master of the Pomona Grange in his home county, or to the Deputy in counties that have no Pomona.

Mr. H. L. Beatty has offered for the year 1909-1910, a similar scholarship of a value of \$75, "open to any farmer who resides in Bainbridge, N. Y., or to any boy over 16, residing in Bainbridge, or who shall have attended the Bainbridge High School for one full term."

### **The Eastman Prize for Public Speaking.**

With the object of developing qualities of personal leadership in rural affairs, Mr. A. R. Eastman of Waterville, N. Y., has established an annual prize of one hundred dollars for public speaking on country life subjects in the College of Agriculture. This prize is designated as the Eastman Prize for Public Speaking. Competition is open to any regular or special student.

## **GENERAL INFORMATION AS TO COURSES.**

The regular instruction in the College of Agriculture is comprised in a four-year course leading to the degree of Bachelor of Science in Agriculture. Aside from this there are winter-courses, not leading to credits in the University, and opportunities for students to pursue special work. A circular describing the winter-courses may be had on application.

Students may pursue agricultural subjects in the Graduate School of the University, leading to the degrees M.S. in Agr. and Ph.D.

### **The Regular Four-Year Course.**

The regular course in the College of Agriculture is four years, and leads to the degree of Bachelor of Science in Agriculture. There is a combined course with the State Veterinary College comprising six years and leading to two baccalaureate degrees (page 26).

Candidates for admission to the regular or four-year course must be at least sixteen years of age, or, if women, seventeen. They must have certificates of good moral character, and students from other colleges or universities are required to furnish from those institutions certificates of honorable dismissal. Students are admitted on examination, or on presenting credentials of the Education Department of the State of New York, or on acceptable school certificates.

Those contemplating entering the College, who have not lived on farms or received considerable practical experience in agriculture, are urged to spend at least one year on a well-managed farm to familiarize themselves with common farm affairs and operations before entering the College.

Candidates for admission must file their credentials and obtain permits for examination at the University Registrar's office, *Morrill 10*. The results of examination may be ascertained from the Registrar.

### Entrance Requirements of Four-Year Course.

The subjects that may be offered for admission are named in the following list, and the figure following each subject indicates its relative weight expressed in units. The term "unit" means the equivalent of five recitations a week for one year in a study.

|  |                                       |
|--|---------------------------------------|
| English (3)  | Trigonometry, Plane ( $\frac{1}{2}$ ) |
| History,* An.(to 814 A.D.) ( $\frac{1}{2}$ -1)     | German, Elementary (2)                |
| History,* Mod. (from 814 A.D.) ( $\frac{1}{2}$ -1) | German, Advanced (1)                  |
| History,* Am. (inc. Civ. Gov.) ( $\frac{1}{2}$ -1) | French, Elementary (2)                |
| History,* English ( $\frac{1}{2}$ -1)              | French, Advanced (1)                  |
| Geometry, Plane (1)                                | Spanish, Elementary (2)               |
| Algebra, Elementary A (1)                          | Spanish, Advanced (1)                 |
| Algebra, Elementary B ( $\frac{1}{2}$ )            | Latin Grammar and Caesar (2)          |
| Geometry, Solid ( $\frac{1}{2}$ )                  | Latin Comp. and Cicero (1)            |
| Algebra, Advanced ( $\frac{1}{2}$ )                | Virgil (1)                            |
| Physics (1)  | Greek Gram. and Xenophon (2)          |
| Chemistry (1)                                      | Greek Comp. and Homer (2)             |
| Botany (1)   | Zoology, †Vert., Invert.† (1)         |
| Physiography (1)                                   | Biology †[Zoology, Botany] (1)        |
|  | Drawing ( $\frac{1}{2}$ -1)           |
|  | Agriculture ‡( $\frac{1}{2}$ -1)      |

For admission to the New York State College of Agriculture, an applicant must offer either A or B as below:

A. Fifteen units arranged as follows: English (3), History (1),

\*An applicant may not count more than  $2\frac{1}{2}$  units of history.

†Biology may not be counted if either Botany (1 unit) or Zoology (1 unit) has been offered.

‡For entrance credit in agriculture, the work outlined in the Syllabus for Secondary Schools—Agriculture, published by the New York State Education Department, 1907, or that outlined as A Secondary Course in Agronomy, Circular 77 (revised), 1908, Office of Experiment Stations, United States Department of Agriculture, or the equivalent of either, must be presented. The presentation of a satisfactory note-book will be considered in giving credit.

Elementary Algebra A (1), Plane Geometry, (1) French (3) or German (3), elective (6).

B. The Arts College Entrance Diploma or the Science College Entrance Diploma issued by the Education Department of the State of New York.

### Old Entrance Requirements.

For the year 1909, but not thereafter, a candidate will be given the option of entering either under the above requirements or under the following old requirements:

#### *Elementary Subjects.*

The following Elementary Subjects are required for admission to all colleges of the University (under old requirements):

|           |                     |
|-----------|---------------------|
| English.  | Plane Geometry.     |
| History.* | Elementary Algebra. |

#### *Advanced Subjects.*

In addition to the Elementary Subjects, an applicant must offer (under the old requirements) from the following list the Advanced Subjects required by the college to which he seeks admission. The figure following each subject indicates its relative weight:

|                           |                               |
|---------------------------|-------------------------------|
| Advanced Mathematics (6). | Latin (18).                   |
| Solid Geometry (2).       | Latin Grammar and Caesar (6). |
| Advanced Algebra (2).     | Latin Composition and         |
| Plane Trigonometry } (2). | Cicero (6).                   |
| Spher. Trigonometry }     | Virgil (6).                   |
| German (12).              | Greek (12).                   |
| Elementary German (6).    | Greek Grammar, Xenophon (6)   |
| Advanced German (6).      | Greek Composition, Homer (6)  |
| French (12).              | Physics (6).                  |
| Elementary French (6).    | Chemistry (6).                |
| Advanced French (6).      | Botany (6).                   |
| Spanish (12).             | Geology or Physiography (6).  |
| Elementary Spanish (6).   | Zoology (6).                  |
| Advanced Spanish (6).     | Drawing (6).                  |

For admission to the College of Agriculture under the old rules, an applicant must offer the Elementary Subjects and also 30

\*One of the following: (1) American (including Civil Government), (2) English, (3), Ancient (to 814 A. D.), (4) Mediæval and Modern European (from 814 A. D.)

units from the list of Advanced Subjects, including 12 units either in French or in German.

### Other Details of Admission.

*For other details as to subjects and methods of admission, see pages 33-66 of the University Register, which may be had on application to the University Registrar, Cornell University, Ithaca, N. Y.*

*For admission to the Freshman class and to advanced standing from other colleges and universities, all communications should be addressed to the University Registrar. See pages 33-66 of the Register.*

*For admission as special student, communications should be addressed to the Secretary, College of Agriculture, and attention is called to the paragraphs on page 61 of the Register.*

*For admission to graduate work and candidacy for advanced degrees, communications should be addressed to the Dean of the Graduate School. See page 78 of the University Register.*

### Requirements for the Degree of Bachelor of Science in Agriculture.

The requirements for the degree of Bachelor of Science in Agriculture shall be residence for eight terms, and, in addition to the prescribed work in the departments of Physical Culture and of Military Science and Tactics, the completion of one hundred and twenty hours of required and elective work as outlined on pages 24-26.

A student who receives at entrance twelve or more hours of entrance credit in addition to the requirements for admission, may be regarded as having satisfied one term of residence. Under no circumstance shall surplus entrance credit be accepted as the equivalent of more than one term.

A student who has satisfied the entrance requirements of this College, and has afterwards completed in two or more Summer Sessions in Cornell University at least twelve hours of work in courses approved by the departments concerned, may be regarded as having thus satisfied one term of residence. Under no circumstances shall work done in Summer Sessions be accepted as the equivalent of more than one term of residence or be counted for more than twelve hours towards graduation.

A student admitted to the College of Agriculture from another College of Cornell University or from any other institution of collegiate rank, shall be regarded as having completed the number



of terms and hours to which his records entitle him, and will receive all the privileges of students who have completed the same number of terms and hours by residence in the College. In order, however, to secure the degree of Bachelor of Science in Agriculture, he must have completed the prescribed subjects in the four-year course, and two-thirds of his elective work must have been taken in courses allowed as agricultural electives. He must also have been in residence in the College of Agriculture at least two consecutive terms and have completed not less than fifteen hours per term of which two-thirds, at least, must be subjects taught by the staff of the College of Agriculture.

A student must register for at least 12 hours each term and no new student may register for more than 18 hours. Maximum registration by old students is determined on the basis of record.

All men students who do not specialize to the extent of fifteen hours in Entomology, Plant-Breeding, Plant Physiology, Rural Art or Home Economics, must pass, before graduation, the examination of the Farm Practice Department. All persons who are required to pass this examination, are recommended to spend at least the equivalent of one full year on a good farm after sixteen years of age and before entering the College.

At least two-thirds of the entire elective work of each year must be chosen from the agricultural subjects described on the following pages.

### The Course Leading to the Degree of Bachelor of Science in Agriculture.

| Freshman year. | No. of<br>course. | Hours 1st<br>half-year. | Hours 2nd<br>half-year. |
|----------------|-------------------|-------------------------|-------------------------|
| English.....   | 1 .....           | 3 .....                 | 3                       |
| Botany.....    | 1 .....           | 3 .....                 | 1                       |
| Botany.....    | 2 .....           | — .....                 | 2                       |
| Chemistry..... | 1 .....           | 6 .....                 | —                       |
| Chemistry..... | 85 or 6 .....     | — .....                 | 4 or 5                  |
| Biology.....   | 1 .....           | 3 .....                 | 3                       |
| Electives..... | .....             | 0-3 .....               | 2-5                     |
| Total.....     |                   | 15-18 .....             | 15-18                   |

| Sophomore year.                   | No. of course. | Hours 1st half-year. | Hours 2nd half-year. |
|-----------------------------------|----------------|----------------------|----------------------|
| Geology*.....                     | I ....         | 3 ....               | 3                    |
| Chemistry†.....                   | 85, 85a ....   | — ....               | 6                    |
| Physics.....                      | I ....         | 4 ....               | —                    |
| Physics.....                      | 5 ....         | 2 ....               | —                    |
| Physics.....                      | 10 ....        | — ....               | 2                    |
| Physiology, one of the following: |                |                      |                      |
| Physiology of domestic animals..  | 21 ....        | — ....               | 3                    |
| Human physiology.....             | 3 ....         | 3 ....               | —                    |
| Plant physiology.....             | 7a or 8a ....  | 4 ....               | —                    |
| Electives.....                    | .....          | 2-9 ....             | 1-13                 |
| Total.....                        |                | 15-18 ....           | 15-18                |

In addition to the above, the required work in military drill and physical training must be taken.

Political Science 51 may be taken during this year.

| Junior year.           | No. of course. | Hours 1st half-year. | Hours 2nd half-year. |
|------------------------|----------------|----------------------|----------------------|
| Political Science..... | 51 ....        | 3 ....               | 3                    |

The remainder of the work is made up of electives, at least two-thirds of which must be taken in the College of Agriculture subject to the following restrictions:

In selecting the subjects in the major group, the student must obtain the advice and approval of some one Professor or Assistant Professor having charge of a subject within the group, who shall be chosen by the student. This shall be done at the beginning of the sophomore year.

All students except those registered in Rural Art shall have passed before graduation at least fifteen hours of agricultural electives in one of the groups named below, and at least three hours in each of the others.

- Group A.— Farm Crops  
Farm Management  
Horticulture  
Home Economics  
Farm Mechanics

\*Optional for students taking a major in Home Economics.

† Required of students taking Chemistry 6 in the Freshman year. The laboratory work, 85a, may be taken during the first half-year, leaving the four-hour lecture course for the second half-year.

Group B.—Animal Husbandry  
Poultry Husbandry  
Dairy Industry

Group C.—Agricultural Chemistry  
Soil Technology  
Plant Physiology  
Plant-Breeding

Group D.—Plant Pathology  
Entomology  
Limnology  
Rural Economy

#### **Combined Course in Agriculture and Veterinary Medicine.**

A regular student who has satisfactorily completed all the required work of his course and who has a credit of at least ninety hours may, with the permission of the faculties concerned, be registered both in the College of Agriculture and in the New York State Veterinary College and, on the completion of thirty hours, of which not less than twelve hours shall be taught in the New York State College of Agriculture, may be recommended for his degree. On the completion of the remaining two years and meeting the requirements of the State Veterinary College, he will then receive the degree of D. V. M.

#### **DEPARTMENTS OF INSTRUCTION.**

**With Outlines of Courses that may be Chosen by Regular or  
Special Students as Agricultural Electives.**

Subject to the restrictions already mentioned (pages 25-26), at least two-thirds of the elective work must be chosen from the courses described on the following pages.

#### **Elective Courses Open to Freshmen.**

Chemistry, 6 (see schedule of Freshman year); Horticulture, 28, 29, 30, 32; Farm Mechanics, 51, 52; Plant Pathology, 1, 2; Entomology, 2, 3, 4, 5; Dairy, 40, 43; Rural Economy, 76; Drawing, 1, 1a, 2; Rural Art, 90; Home Economics, 1; Meteorology and Climatology, 103; Extension, 105.

Unless otherwise noted, all courses are given in the buildings of the College of Agriculture. Agricultural Chemistry is given in Morse Hall. Courses inclosed in brackets are not given in 1909-1910.

### Botany.

6. **Exotics.** One or two hours. The conservatory in connection with the Botanical Department offers opportunities for students who wish to become familiar with practical methods in propagation and cultivation of conservatory plants and in practical greenhouse work. Mr. Shore, the expert gardener, will have charge of the instruction and practical work. Students desiring to take this course should consult Professor ATKINSON, who will have charge of conference and reports. Hours by appointment. *Sage Conservatory.*

### Agricultural Chemistry.

85. **Agricultural Chemistry.** Open only to those who have taken Chemistry I. Second half-year. Credit, four hours. Lectures, T., Th., S., 11. *Chemistry Lecture Room 1.* One recitation at hours to be arranged. Professor CAVANAUGH and Mr. HEDGES.

A general course treating of the relations of chemistry to agriculture and dealing with the composition and properties of plants, soils, fertilizers, feed-stuffs, insecticides and fungicides.

85a. **Agricultural Chemistry.** Laboratory course. Designed to accompany course 85. Required of those who have completed Chemistry courses I and 6 and are taking course 85. Professor CAVANAUGH and Mr. HEDGES.

86. **Agricultural Chemistry.** Advanced course. Open to those who are taking or have completed courses 87 or 88. First half-year. Credit, two hours. Lectures, T., Th., 9. *Chemistry Lecture Room 4.* Professor CAVANAUGH.

87. **Agricultural Analysis.** Open only to those who have completed courses I and 6. First half-year. Laboratory practice in sections to be arranged. Professor CAVANAUGH and Mr. CROSS.

Foods, feeding-stuffs and dairy products.

88. **Agricultural Analysis.** Open only to those who have completed courses I and 6. Second half-year. Laboratory practice in sections to be arranged. Soils, fertilizers, insecticides and fungicides. Professor CAVANAUGH and Mr. CROSS.

[89. **Dairy Chemistry.** Open only to those who have taken courses I, 6 and 85. First half-year. Credit, two hours. Lectures T., Th., 9. *Chemistry Lecture Room 4.* Professor CAVANAUGH.]

Dairy Chemistry laboratory practice is given in course 87.

90. **Advanced Agricultural Analysis.** Credit and hours by arrangement and appointment. Professor CAVANAUGH.

This course is designed to meet the needs of those doing research work in Agricultural Chemistry.

**185. Elementary Agricultural Chemistry.** Open only to special students. First half-year. Credit, three hours. Lectures, M., W., F., 8. *Chemistry Lecture Room 2.* Professor CAVANAUGH, Mr. HEDGES and Mr. CROSS.

### Soil Technology.

**1. Principles of Soil Management.** Second half-year. Credit, three hours. Must be preceded or accompanied by Chemistry 85 and Geology 1. Lectures M., W., 10. *Agronomy 152.* Laboratory M., W., Th., or F., 2-4:30. *Agronomy 42.* Professor FIPPIN and Mr. CRABB.

An elementary course covering the derivation, classification, function, and properties of soils and the principles of their management in plant production.

**101. Principles of Soil Management.** For special students only. First half-year. Credit, three hours. Must be preceded or accompanied by Chemistry 185. Lectures, M., W., 10. *Agronomy 152.* Laboratory M., W., Th., or F., 2-4:30. *Agronomy 42.* Professor FIPPIN and Mr. CRABB.

An elementary course covering the derivation, classification, function and properties of soils and the principles of their management in plant production.

**2. Soils of the United States.** Second half-year. Credit, three hours. Must be preceded by Soils 1 or 101. Lectures T., Th., 10. *Agronomy 152.* Excursion or recitation F., 2-4:30. *Agronomy 152.* Professor FIPPIN.

A discussion of the classification and occurrence of soils in the United States, and especially in New York, with particular reference to their distribution, agricultural importance, crop adaptation and special features in their management. Designed to give a comprehensive view of the soil resources of the country. Illustrated by maps and slides.

**3. Soil Mapping.** First half-year. Credit, two hours. Must be preceded by Soils 1 or 101. Field practice S., 8-1. Mr. CRABB.

Preparation of large scale soil maps of selected areas together with detailed reports on same. Also excursions for the study of the utility of general and farm soil maps.

**4. Advanced Soils.** First half-year. Credit, two hours. Must be preceded by Soils 1. Lecture T., Th., 10. *Agronomy 152.* Professor FIPPIN.



Discussion of the physical, chemical and biological properties of the soil as they bear on crop production. Methods of mechanical analysis, physics of the retention and movement of moisture and air, absorption of heat, chemistry of the soil solution, alkali and its amelioration and the biological relations of the soil as they affect fertility.

5. **Advanced Laboratory in Soils.** Throughout the year. Credit, one or two hours each half-year. Must be preceded or accompanied by Soils 4 and accompanied by Soils 8. *Agronomy 42*. Hours by arrangement. Professor FIPPIN and Mr. CRABB.

A series of experiments illustrating the physical and chemical properties of the soil in their relation to moisture and plant production. Principles of soil investigation.

6. **Irrigation and Drainage.** Second half-year. Credit, two hours. Must be preceded by Soils 1 or 101. Lecture, F., 10. *Agronomy 152*. Laboratory S., 9-12. Professor FIPPIN and Mr. CRABB.

History, economic relations, principles and practice of irrigation and drainage.

7a. **Research in Soils.** For undergraduates and graduate students. Admission and hours by appointment. Must be accompanied by Soils 8. Professor FIPPIN.

Investigation of selected subjects.

7b. **Research in Soils.** For graduate students only. One or two graduate students who are qualified to conduct research in certain phases of soil investigation may register for a major subject in the soils research laboratory. *Agronomy 211*. Professor LYON and Assistant Professor BIZZELL.

8. **Soil Seminar.** Throughout the year. Credit, one hour each half-year. Required of all students taking graduate work in Soils and of all undergraduate students taking Soils 5 or 7 or thesis work. M., 7-8:30 P. M. *Agronomy 152*. Professor LYON, Professor FIPPIN, Assistant Professor BIZZELL and Mr. CRABB.

### Plant Physiology.

3b. **Crop Ecology and Geography.** Open to regular students after the freshman year and to special students, with preparation in biology, by arrangement. Second half-year. Credit, two hours, W., F., 11. *Agronomy 192*. Professor DUGGAR and Mr. McCool.

Lectures and demonstrations emphasizing the relations of plants to climate. A study of crops and economic plants with respect to environment and distribution.

[6a. **Bacteriology with Reference to Plant Industry.** Not offered during 1909-10].

The principles of bacteriology, especially with respect to the conditions of growth of the bacteria, their relations to decomposition, nitrification, etc.

7a. **General Plant Physiology.** Open to students who have completed required freshman work, or to prepared special students by arrangement. Limited to 24, 1909-10. First half-year. Credit, four hours. Lectures M., W., 9. *Agronomy 101*. Laboratory Th., 2 to 4:30, S., 10-12:30. Mr. KNUDSON and Mr. MCCOOL.

Lectures, laboratory and field studies of living plants and growing crops, including such topics as absorption, nutrition, relations to environmental factors, growth, reproductive and propagative processes. (Recommended in preference to course 8 for students taking general agriculture.)

8a and b. **Plant Physiology.** Open to students who have sufficient preparation in botany and chemistry. Credit, four hours. Lectures and recitations, Th., S., 9. *Agronomy 102*. Laboratory, W., F., 2 to 4:30. Professor DUGGAR and Mr. KNUDSON.

A more complete and comprehensive course, recommended in preference to 7a for students specializing in plant industry work. More attention will be paid to the relation of plant structure to function, to the chemistry of nutrition, and other phases of special physiology.

12a. **Cell Physiology.** First half-year. Credit, three hours. Lectures F., 10. *Agronomy 101*. Laboratory T., 2-5; S., 11-1. Professor DUGGAR and Mr. KNUDSON.

A course offering to advanced students instruction in the physiology of the cell, with special reference to cell division, the cytology of gamete-production, fertilization, etc. Microtechnique. (This course is given with the view of preparing students for special studies in problems of cytology and heredity, which may be continued as research during the second half-year and afterward.)

*Primarily for Graduates.*

15b. **The Physiology of Fermentation.** Second half-year. Credit, three hours. Hours to be arranged. *Agronomy 101*. Mr. KNUDSON.

The physiology of fermentation and enzyme action in plants, the uses and applications of enzymes and enzyme-producing organisms. The fermentation of fruit juices and the action on carbohydrate compounds will be considered in detail.

16. **General Seminary.** The first half-year (1909-10) will be devoted to a discussion of habitat, variation and the principles of evolution. During the second half-year topics will be selected from current work in plant physiology. Reports on research work or on topics assigned will be required. Credit, one hour. S., 10-11. Limited to advanced students in the department. Professor DUGGAR.

17b. **Seminar in Cytology.** Second half-year. Credit, one hour. Hour by appointment. Professor DUGGAR.

18. **Research, General Physiology.** Credit as a major or minor, otherwise not less than four hours, except when taken by seniors as a thesis. Hours by appointment. *Agronomy 101.* Professor DUGGAR.

19. **Research, Cell Physiology.** Credit as in 17. Open to advanced students who have had 12a or equivalent. Hours by appointment. *Agronomy 101.* Professor DUGGAR.

In courses 18 and 19, problems in plant physiology (including ecology, cytology and heredity), and the relation of plant physiology to agriculture will be assigned for investigation. Reports or a thesis will be required.

### Plant-Breeding.

1. **Plant-Breeding.** First half-year. Credit, three hours. Lectures, T., Th., 10. *Agronomy 192.* Laboratory, T., 2-4:30. Assistant Professor GILBERT.

This course will undertake a careful consideration of the principles and practice of plant-breeding, with reference to variation, selection and hybridization, as factors in the amelioration of cultivated plants. Special consideration will be given to the methods and results of present day plant-breeders.

2. **Advanced Plant-Breeding.** Open only to those who have had Plant-Breeding 1, or its equivalent. Second half-year. Credit, three hours. Lectures, T., Th., 10. *Agronomy 192.* Laboratory, Th., 2-4:30. Assistant Professor GILBERT. Special lectures will be given by members of the Experimental Staff.

A critical study of the principles underlying breeding; variation, transmission and fixation of characters, correlation, biometry; theories of the mechanism of heredity.

[3. **Biometry.** Not offered during 1909-10.]

This course will consist of a discussion and application of statistical methods as applied to problems in biology and practical breeding.

4. **Investigation.** Primarily for senior thesis work. Credit, two hours each half-year. Must be continued throughout the entire year. Hours by appointment. Assistant Professor GILBERT.

5. **Research.** Special work for a few advanced graduate students. Arranged with reference to individual aims and attainments. *Agronomy 311*. Professor WEBBER, Assistant Professor LOVE, Assistant Professor GILBERT and Mr. CLARK.

Problems in plant-breeding, heredity and general evolutionary topics.

6. **Seminar.** Required of all graduate students in the department. Time and place to be announced. Professor WEBBER, Assistant Professor LOVE, Assistant Professor GILBERT and Mr. CLARK.

A seminar for the discussion of the fundamental problems of plant-breeding, heredity and general evolution, methods of plant-breeding, etc.

### Farm Crops and Farm Management.

#### *Farm Crops.*

1. **Cereals.** Must be preceded by Soils 1 or 101. First half-year. Credit, four hours. Lectures, M., W., F., 10. *Agronomy 192*. Practice one afternoon per week, M. or T., 2 to 4:30. *Agronomy 202*. Professor WARREN, Assistant Professor WHITE and Mr. LIVERMORE.

Lectures, recitations and laboratory practice on the history, production and marketing of cereal crops. Field trips are taken on all laboratory days when the weather is suitable.

2. **Forage Crops, Potatoes and Miscellaneous Crops.** Must be preceded by Soils 1 or 101 and Farm Crops 1. Students who have had Farm Crops 12 may receive three hours credit for this course. Second half-year. Credit, four hours. Lectures, M., W., F., 10. *Agronomy 192*. Practice one afternoon per week, M. or T., 2 to 4:30. *Agronomy 202*. Assistant Professor WHITE.

Lectures, recitations and laboratory practice on the history, production and marketing of potatoes, field beans, forage crops and miscellaneous crops.

3. **Cereals and Forage Crops.** Must be preceded or accompanied by Soils 1 or 101. First half-year. Credit, four hours. Lectures, M., W., F., 9. *Agronomy 192*. Practice one afternoon per week, Th. or F., 2 to 4:30. *Agronomy 202*. Assistant Professor WHITE.

A brief course in which consideration is given to a few of the



most important crops. Designed for those who cannot take courses 1 and 2.

4. **Advanced Farm Crops.** Must be preceded by Farm Crops 1 or 3. Second half-year. Credit, two hours. Hours to be arranged. Open to a limited number of students. *Agronomy 202*. Assistant Professor WHITE.

A further study of Farm Crops, including lectures and laboratory practice.

5a. **Research.** Must be preceded by Farm Crops 1 and 2, or 3, and must be accompanied by course 15. First half-year. Credit, two or more hours. Open to a limited number of students. Admission and hours by appointment. Professor WARREN, Assistant Professor WHITE and Mr. LIVERMORE.

Investigation of special farm crop subjects. Also a study of current experiment station literature.

5b. **Research.** Must be preceded by Farm Crops 1 and 2, or 3, and must be accompanied by course 15. Second half-year. Credit, two or more hours. Open to a limited number of students. Admission and hours by appointment. Professor WARREN, Assistant Professor WHITE and Mr. LIVERMORE.

### *Farm Management.*

1. **Farm Management.** It is recommended that this subject be taken in the Junior year. As many as possible of the following courses should precede or accompany Farm Management: Farm Crops 1 and 2, or 3, Animal Husbandry 31, Horticulture 20 and 21, Farm Mechanics 51 and 52, Poultry Husbandry 37 and 38, Dairy Industry 40 and 43, and Farm Practice. Students who have had or who are taking Farm Crops and Animal Husbandry and who have passed the Farm Practice examination will be admitted to the class. Certain other combinations of the above subjects will also be accepted after conference. Second half-year. Credit, four hours. Lectures, M., W., F., 9. *Agronomy 192*. Practice one afternoon per week, Th. or F., 2 to 4:30. On days when farms are visited the laboratory work will not close at 4:30. *Agronomy 202*. Professor WARREN and Mr. LIVERMORE.

Lectures, recitations and laboratory practice on elementary farm accounting, selection and purchase of farms, cost and relative profit of various farm operations and systems of farming, organization of the farm business with preparation of plans for the management of specific farms with financial estimates. Trips to farms are taken on all laboratory days when the weather is suit-



able. Two one-day excursions, about May 13-14, to farms at some distance from Ithaca, estimated to cost not over \$5.

2. **Advanced Farm Management.** Must be preceded by Farm Management 1. First half-year. Credit, two hours. Th. 2-5. *Agronomy 192.* Professor WARREN and Mr. LIVERMORE.

A further study of farm management, including lectures, problems, reading and trips to successful farms. Expenses for the excursions are estimated to cost not over \$5.

3a. **Research.** Must be preceded by Farm Management 1 and must be accompanied by course 15. First half-year. Credit, two or more hours. Open to a limited number of students. Admission and hours by appointment. Professor WARREN and Mr. LIVERMORE.

Investigation of special problems in farm management.

3b. **Research.** Must be preceded by Farm Management 1 and must be accompanied by course 15. Second half-year. Credit, two or more hours. Open to a limited number of students. Admission and hours by appointment. Professor WARREN and Mr. LIVERMORE.

15. **Seminar.** Required of all students taking research work in Farm Crops or Farm Management. A limited number of students who are taking Farm Crops 4 or Farm Management 2 may be admitted. Not open to other students. Credit, one hour. W., 2-4:30. *Agronomy 202.* Professor WARREN, Assistant Professor WHITE and Mr. LIVERMORE.

### Horticulture.

Courses 1 and 2 in Botany are prerequisites to all courses in Horticulture except courses 20a, 28 and 29.

### *Pomology.*

20. **Elementary Pomology.** Must be preceded by Botany 1 and 2. First half-year. Credit, three hours. Lectures, T., Th., 11. Laboratory, F., 2 to 4:30. *Main 292.* Assistant Professor WILSON and Mr. ———.

A study of the methods of propagation and early care of bush and tree fruits; the principles of budding and grafting, with special attention to the particular method of propagation for each kind of fruit. The class will participate in a required excursion to Geneva and vicinity, October 16th.

20a. **Elementary Pomology.** Not open to those who are required to take Botany 1 and 2. First half-year. Credit, three

hours. Lectures, T., Th., 10. Laboratory, M., 2 to 4:30. Assistant Professor WILSON and Mr. \_\_\_\_\_.

A study of the methods of propagation and early care of bush and tree fruits; the principles and practices of budding and grafting, with special attention to the methods of propagating for each kind of fruit. Similar to course 20, but particularly adapted to the needs of a special student. Class will participate in a required excursion to Geneva and vicinity, October 9th.

**21. Practical Pomology.** Open only to those who have had Horticulture 20 or 20a. Second half-year. Credit, three hours. Lectures, T., Th., S., 10. *Main 202.* Assistant Professor WILSON.

The study and practice of the planting, fertilizing and care of orchards; picking, grading, packing and marketing of fruits. Class will participate in a required excursion to the fruit growing sections of Geneva and Rochester, May 20 and 21.

**22. Bush and Small Fruits.** Open to students who have had Horticulture 20 or 20a. Second half-year. Credit, one hour. Lectures and discussions, M., 10. *Main 202.* Assistant Professor WILSON and Mr. \_\_\_\_\_.

A study of vine and bush fruit culture, including strawberries, covering the picking, grading, packing and marketing of the product.

**23. Spraying of Fruit Trees.** Open only to those who have had Horticulture 20 or 20a and Plant Pathology 1, and have taken, or are taking, Entomology 8 or 16. Second half-year. Credit, two hours. Lecture, W., 10. Laboratory, W., 2 to 4:30. *Main 202.* Assistant Professor WILSON and Mr. \_\_\_\_\_.

A study of the preparation and application of the different spray mixtures used in orchard practice.

**24. Systematic Pomology.** Open to those who have had course 21 or its equivalent. First half-year. Credit, two hours. Lecture, W., 10. Laboratory, W., 2 to 4:30. *Main 202.* Assistant Professor WILSON and Mr. \_\_\_\_\_.

A critical examination of characters and qualities of the deciduous fruits of the United States, with reference to botany relationships, adaptations and commercial value.

**25. Advanced Pomology.** Open to students who have had courses 20 and 21. One hour throughout the year. Lectures and discussions, F., 10. *Main 201.* Assistant Professor WILSON.

Designed especially for students who are planning to do practical and experimental work in pomology. A critical study of the different fruits and the various problems connected with growing them.

26. **Research in Pomology.** Open only to those who have had 20 and 21 and 23. Students taking this course are required to take course 38. Credit, one or more hours. By appointment. Assistant Professor WILSON.

Original investigation of problems in pomology.

*Olericulture and Floriculture.*

28. **Greenhouse Construction.** First half-year. Credit, three hours. Lectures, M., Th., 12. Laboratory, F., 2 to 4:30. *Main 232.* Assistant Professor JUDSON and Mr. BATCHELOR. The class will participate in a required excursion to Elmira, December 4.

The development of the modern greenhouse. Types of houses, materials, and methods of construction, installation of heating systems, etc. Laboratory practice in erecting wood and iron-frame, and in planning and estimating cost of commercial ranges.

29a. **Floriculture.** First half-year. Credit, three hours. Lectures, W., F., 9. Laboratory, T., 2 to 4:30. *Main 292.* Assistant Professor JUDSON, Mr. BATCHELOR and Mr. MOORE.

Florists' plants, their history, botany, culture, diseases, etc. Laboratory practice in the greenhouses. Those desiring more work in the greenhouse can arrange for one or two additional periods, with credit.

29b. **Floriculture.** Second half-year. Credit, three hours. Lectures, W., F., 11. Laboratory, T., 2 to 4:30. *Main 232.* Assistant Professor JUDSON, Mr. BATCHELOR and Mr. MOORE.

A continuation of course 29a, concluding with outdoor floriculture. May be taken without course 29a, if desired.

30a. **Vegetable-Gardening.** First half-year. Credit, three hours. Lectures, T., Th., 9. Laboratory, M., 2 to 4:30. *Main 232.* Assistant Professor JUDSON and Mr. BATCHELOR.

Principles of vegetable gardening, and study of each crop in detail. Forcing vegetables under glass. Laboratory work consists of study of varieties, and greenhouse work.

30b. **Vegetable-Gardening.** Second half-year. Credit, three hours. Lectures, T., Th., 9. Laboratory, F., 2 to 4:30. *Main 232.* Assistant Professor JUDSON and Mr. BATCHELOR.

Lectures a continuation of course 30a. Laboratory practice in the greenhouse, with hotbeds, and in the garden. May be taken without course 30a if desired.

*Advanced and Special Courses.*

32. **Elementary Horticulture.** Credit, two hours, throughout the year. Lecture T., 10. Laboratory, F., 2-4:30, at the green-

house and by appointment. Professor CRAIG and Messrs. BATCH-  
LOR, MOORE and HUNN.

This course aims to emphasize principles and practices involved in the cultivation of garden plants grown for pleasure or profit. It includes the propagation, botany, culture, and economic uses of plants. Some attention is also given to garden making. Designed for teachers of nature-study or of elementary agriculture.

33. **Nuciculture.** Second half-year. Credit, two hours. Lectures, M., W., 11. *Main 201.* Professor CRAIG.

Lectures on the practical and systematic phases of nut-culture, with special reference to the cultivation and improvement of the forms native to the United States.

The Morris collection of edible nuts of the world in the Department of Horticulture furnishes abundant material for illustrating the lectures.

[34. **Subtropical Pomology.** First half-year. Credit, three hours. Lectures, T., Th., 9. Laboratory Th., 2 to 4:30. *Main 232.* Professor CRAIG and ————.]

A study of citrus and other tropical fruits, with special reference to American conditions. Copiously illustrated. Laboratory work in describing and judging the various fruits (not given 1909-10.)

35. **Literature of Horticulture and Landscape Gardening.** Open to juniors and seniors, and required of graduates. First half-year. Credit, two hours. Lectures, T., Th., 11. *Main 232.* Professor CRAIG.

A comprehensive survey of the writings of European and American authors, with special reference to the evolution of horticultural methods.

36. **Evolution of Plants.** Second half-year. Credit, three hours. Lectures, T., Th., F., 11. *Main 232.* Professor CRAIG.

Open to juniors and seniors, and required of graduates. Historical development of theories of evolution; recent theories including a careful examination of present-day methods. Practice in the greenhouse in the technique of plant-breeding.

37. **Investigation.** The student is assigned a subject which, as far as possible, combines original research with bibliographical methods. For advanced students and graduates. Hours by appointment. Professor CRAIG, Assistant Professor JUDSON.

38. **Seminary.** Required of advanced students who elect course 37, and of all graduate students. Credit, one hour. Thursday, 7 to 8 P. M. Members of this seminary are also expected to attend the seminary in plant industry, W., 4:35 to 6, see page 40. Professor CRAIG, Assistant Professors JUDSON and WILSON.

**Farm Mechanics.**

51. **Farm Mechanics.** Either half-year. Credit, three hours. Lectures, first half-year, T., Th., 8; or second half-year, T., Th., 12. *Agronomy* 152. Practice, M., T., or W., 2-4:30. Assistant Professor H. W. RILEY and Mr. \_\_\_\_\_.

A study of the elements of mechanics and of machine design entering into the construction of all machinery, followed by a special study of: A—Motors, including gasoline and steam engines, steam boilers, power transmission, windmills, water wheels, pumps, hydraulic rams and a brief discussion of the laws and applications of electricity. B—Farm machinery for tillage, seeding, harvesting, etc., with a discussion of the cost, life, draft and special mechanical features of some of the machines now on the market.

52. **Farm Engineering.** Open only to students who have had plane geometry. Either half-year. Credit, three hours. Lectures, first half-year, T., Th., 12; or second half-year, T., Th., 8. *Agronomy* 152. Practice, M., T., or Th. 2-4:30. Assistant Professor H. W. RILEY and Mr. ROBB.

A study of the practical solution of the problems involved in connection with farm water supply and sewage disposal; surveying and mapping the farm; locating, digging and laying drains; laying out building foundations; selecting and testing cement; the mixing and use of concrete for building foundations, laying floors, and for other farm purposes.

60. **Research.** Special work in the study of problems in connection with any of the numerous branches of farm mechanics may be undertaken by students of sufficient training or natural aptitude for the work. Hours by appointment. Assistant Professor H. W. RILEY.

**Farm Practice.**

19. **Farm Practice.** Not given for University credits, but to assist students in meeting the requirements of farm practice demanded by the College. Hours by appointment. Professor STONE and Mr. MINNS.

An elective course especially designed for students who are not familiar with ordinary farm methods and farm practices.

**Plant Pathology.**

1. **Plant Pathology.** A prerequisite for all other courses in plant pathology. Must be preceded or accompanied by Botany 1 and 2. First half-year. Credit, three hours. Lecture, F., 12.



*Agronomy 152.* Laboratories in two sections: A—W., F., 2 to 4:30. B—Th., 2 to 4:30 and S., 10 to 12:30. *Agronomy 302.* Students may not split sections. Professor WHETZEL and Mr. BARRUS.

A fundamental course treating of the common diseases of cultivated plants, their nature, cause and control.

2. **Principles of Plant Disease Control.** Must be preceded by course 1. Second half-year. Credit, three hours. Lecture, F., 12. *Agronomy 152.* Laboratories in two sections: A—W., F., 2 to 4:30. B—Th., 2 to 4:30 and S., 10 to 12:30. *Agronomy 302.* Assistant Professor REDDICK and Mr. JENSEN. Professor CAVANAUGH and Assistant Professor H. W. RILEY will collaborate in this course.

A consideration of the various methods for the control of plant diseases, including sanitation, seed treatment, seed selection, spraying, etc.

3. **Laboratory Methods in Plant Pathology.** Required of all students doing advanced work. Credit, one hour. Lecture, M., 12. *Agronomy 302.* Professor WHETZEL and Assistant Professor REDDICK. Lecture course.

4. **Etiology of Plant Diseases.** Credit, three hours. Lecture, T., 12. Laboratories, M., and T., 2-4:30. *Agronomy 326.* Professor WHETZEL and Assistant Professor REDDICK.

Designed especially for students who desire to specialize in plant pathology. The taxonomy and phylogeny of plant disease-producing organisms.

5. **Diseases of Field and Truck Crops.** Prerequisite course 1. First half-year 1909-10. Credit, three hours. Conference, T., 12. *Agronomy 302.* Two laboratory periods, 2½ hours each, to be arranged. Professor WHETZEL and Mr. BARRUS.

6. **Diseases of Fruits and Fruit Trees.** Prerequisite, course 1. Second half-year 1909-10. Credit, three hours. Conference, T., 12. *Agronomy 302.* Two laboratory periods, 2½ hours each, to be arranged. Assistant Professor REDDICK and Mr. JENSEN.

[7. **Diseases of Greenhouse and Florist's Crops.** Not given 1909-10. Alternating from year to year with course 5.]

[8. **Diseases of Trees and Ornamental Shrubs.** Not given 1909-10. Alternating from year to year with course 6.]

Courses 5, 6, 7 and 8 are designed especially for students who expect to become practical agriculturists and who desire further information in regard to the diseases of the specific crops in which they may be interested.

9. **Research.** For graduate students. Professor WHETZEL

and Assistant Professor REDDICK. Original investigation of problems in plant pathology.

10. **Seminar.** One hour each week. Credit, one hour. Hour to be arranged. Required of all students doing special or graduate work in plant pathology. Devoted chiefly to the review and study of the current literature of the subject.

### Plant Industry Seminar.

Throughout the year. W., 4:35-6 of each alternate week. *Agronomy 152.* A union seminar, including the departments of Farm Crops, Soil Technology, Farm Practice, Farm Mechanics, Plant Pathology, Plant-Breeding, Plant Physiology and Horticulture. May be elected by students who are members of the seminar, of any department in the College. Credit may be received for attendance when it takes the place of departmental seminar work.

For the discussion of topics relating to plant production in its broadest sense. Designed to bring together and correlate the departments of knowledge concerned with plant production and to give a greater breadth of view to the workers in these fields. Each department mentioned above will occupy one period in the presentation of some phase of its own subject. The remaining periods will be given to a consideration of current topics of general concern.

### General Biology.

1. **General Biology.** Three hours per week throughout the year. Lectures, T., Th., 10. *Dairy Building 222*, and one practical exercise, in sections; first section W., 2 to 4:30; second section Th., 2 to 4:30; third section, F., 2 to 4:30; fourth section, S., 8 to 10:30. *Main, 302.* Assistant Professor NEEDHAM, Professor COMSTOCK, and Mr. MATHESON.

This is an elementary course designed to acquaint the general student with the main ideas of biology through selected, practical studies of the phenomena on which biological principles are based. Both lectures and laboratory work will deal with such topics as:—the interdependence of organisms, the simpler organisms, organization and phylogeny, oogenesis and ontogeny, heredity and variation, natural selection and adaptation, segregation and mutation, the life cycle, metamorphosis and regeneration, and the psychic life of organisms. The object of so general a course is to give a bird's-eye view of the biological field and an elementary acquaintance with the principles of development.

**Entomology and General Invertebrate Zoology.**

[1. **Invertebrate Zoology.** General course. Not given in 1909-10. Students wishing to begin the study of zoology may take either General Biology course 1 or Morphology of Invertebrates course 2.]

2. **Morphology of Invertebrates.** Laboratory work either term by appointment. *Main 301.* Assistant Professor MACGILLIVRAY.

The comparative study of the anatomy of representatives of the principal groups of invertebrates.

3. **General Entomology.** Open only to students who have had or are taking a course in zoology or in general biology. Credit, two or three hours. Second half-year. M., W., 9. *Main 392.* Professor COMSTOCK. One practical exercise in sections for those who have not had courses 4 and 5. First section, M., 2 to 4:30; second section, T., 2 to 4:30. *Main 301.* Assistant Professor MACGILLIVRAY.

Lectures on the characteristics of the orders, suborders, and the more important families, and on the habits of representative species. The practical exercises include a study of the structure of insects and practice in their classification.

4. **Elementary Morphology of Insects.** Credit, three hours. Laboratory open daily ex. S., 8 to 5. *Main 391.* Assistant Professor W. A. RILEY and Mr. HASEMAN.

A laboratory course.

5. **Elementary Systematic Entomology.** Open only to students who have taken course 4. Credit, three hours. Laboratory open daily ex. S., 8 to 5. *Main 301.* Assistant Professor MACGILLIVRAY.

A laboratory course.

6. **Advanced Systematic Entomology.** Credit, three hours. Laboratory work either term by appointment. *Main 301.* Assistant Professor MACGILLIVRAY.

A laboratory course.

7. **Histology of Insects.** Open only to students who have taken courses 4 and 5. Credit, three or more hours. Lectures, first half-year, Th, at 9. Laboratory work either term by appointment. Assistant Professor W. A. RILEY.

An introductory course of lectures and laboratory work.

8. **Economic Entomology.** Open only to students who have taken course 3. Lectures and field work, first half-year. Credit, two hours. M., W., 9. *Main 392.* Assistant Professor HERRICK.

Discussion of the more important insect pests and of methods of controlling them. At opportune times the class will be taken into the field to observe insect pests at work.

9. **Advanced Economic Entomology and Insectary Methods.** Open only to graduates and to students who have taken courses 3, 4, 5 and 8. Lectures, seminary and field work. Credit, two hours. Two afternoons a week by appointment. *Insectary.* Assistant Professor HERRICK.

Economic problems connected with applied entomology, discussed, reported upon, and field observations made. Experimental methods in breeding, photographing, investigating and controlling insects discussed and studied. Designed for advanced students in entomology who desire to fit themselves for Experiment Station work.

10. **Classification of the Coccidae.** Open only to students who have taken courses 4 and 5. Second half-year. Credit, five hours. Lectures and laboratory work by appointment. *Main 301.* Assistant Professor MACGILLIVRAY.

A course designed to familiarize the students with the more injurious species of scale insects, the method of preparing specimens for study and the systematic arrangement of the species.

[11. **Morphology and Classification of the Arachnida.** Laboratory open, M., T., 8 to 5, W., Th., F., 8 to 1. *Main 391.* Not given in 1909-10. Professor COMSTOCK.]

A special laboratory course.

[12. **Morphology and Development of Insects.** Open only to students who have taken courses 1, 3, 4 and 5. Students are advised to take course 7 also before taking this course. Second half-year. Credit, two hours. T., Th., 9. *Main 392.* Not given in 1909-10. Professor COMSTOCK and Assistant Professor RILEY.]

Lectures and demonstrations.

13. **Research in Entomology.** Advanced laboratory courses. Special work arranged with reference to the needs and attainments of each student.

13a. **Research in Morphology of Insects.** Laboratory open daily except S., 8 to 5. S., 8 to 1. *Main 391.* Professor COMSTOCK and Assistant Professor W. A. RILEY.

13b. **Research in Systematic Entomology.** Laboratory open daily, except S., 8 to 5. S., 8 to 1. *Main 301.* Professor COMSTOCK and Assistant Professor MACGILLIVRAY.

13c. **Research in Economic Entomology.** Laboratory and field work by appointment. *Insectary.* Assistant Professor HERRICK. In most cases it is impracticable to complete an



investigation in course 13c during the college year; students must arrange to carry on their observations during the growing season.

14. **German Entomological Reading.** Open only to advanced students in entomology or zoology. Credit, one hour. M., 7 to 9 P. M. *Main 391.* Assistant Professor W. A. RILEY.

The aim of this course is to aid the student in acquiring a knowledge of German zoological literature. Each student is required to subscribe for the periodical selected as the basis for the work, and in addition to reading this, some extended German monograph will be translated.

16. **Elementary Economic Entomology.** Not open to students who are prepared to take course 8. First half-year. T., Th., 10. *Main 392.* Credit, two hours. Assistant Professor HERRICK.

Lectures and field work. Discussion of insects in general, and the lives of the more important agricultural pests, with remedial suggestions. At opportune times the class will be taken into the field in sections to observe insect pests at work.

17. **Literature of Systematic Entomology.** Open only to students who have taken courses 4 and 5. First half-year. Credit, two hours. W., F., 11. *Main 392.* Assistant Professor MACGILLIVRAY.

A systematic study of bibliographies, indexes, and general entomological literature; the preparation of catalogues of insects; the evolution of the rules of zoological nomenclature; and the methods of determining the priority of generic and specific names.

18. **Embryology of Insects.** Open only to students who have taken courses 1, 3, 4 and 5. Second half-year. Credit, one hour. Th., 9. *Main 392.* Assistant Professor W. A. RILEY.

Lectures and demonstrations.

19. **General Limnology.** Open only to students who have taken or are taking course 1 in general biology. Second half-year. Credit, three hours. One lecture and two laboratory periods by appointment. *Main 302, and Biological Field Station.* Assistant Professor NEEDHAM.

20. **Research in Limnology.** Hours and credits to be arranged individually. *Main 302 and Biological Field Station.* Assistant Professor NEEDHAM.

The biological field station, in the marsh at the head of Cayuga Lake, will afford excellent facilities for field-studies in limnology, and for many sorts of ecological investigations.



22. **Animal Parasites and Parasitism.** First half-year. Credit, two hours. T., 8 and one practical exercise T., 2 to 4:30. *Main 392.* Assistant Professor W. A. RILEY and Professor COMSTOCK.

A consideration of the origin and biological significance of parasitism and of the structure, life-history and economic relations of representative animal parasites.

23. **The Relations of Insects to Disease.** Second half-year. Credit, two hours. T., 8 and one practical exercise T., 2 to 4:30. *Main 392.* Assistant Professor W. A. RILEY and Professor COMSTOCK.

A continuation of course 22 but considers primarily the agency of insects and other arthropods in the causation or the transmission of diseases of man and animals.

**Seminary.** Monday, 4:30 to 5:30. *Main 392.*

The work of an entomological seminary is carried on by the Jugatae, an entomological club which meets for the discussion of current literature and of the results of investigations. Attendance at the meetings may be counted as laboratory work.

### Animal Husbandry.

31. **Animal Husbandry.** Credit, four hours. Lectures, M., W., F., 9. Practice, one hour in sections, M., T., W., Th., or F., 2:30 to 4:30 by appointment. *Animal Husbandry Building.* Professor WING, Assistant Professor HARPER and Mr. SAVAGE.

The principles of breeding, including the history, development, creation and improvement of the various races and breeds of farm animals; the principles of feeding, care, selection and management of dairy and beef cattle, sheep and swine.

32. **Meat and Milk Production.** Must be preceded by the first term of course 31. Second half-year. Credit, three hours. Lectures, W., F., 11. Library work as assigned. *Animal Husbandry Building.* Professor WING and Assistant Professor HARPER.

A study of practical methods of milk, beef, mutton and pork production, especially as based on the results of experiment.

33. **Practice in Feeding and Stable Management.** Must be preceded by course 31. The ability to milk well is required. Credit, three hours. Daily 7:30 to 9. *Barns and Stables.* Professor WING and Mr. G. W. TAILBY, Jr.

34. **The Horse.** Must be preceded by course 31. First half-year. Credit, four hours. Lectures or recitations, M., W., F., 11. Practice, T., 10-1. *Animal Husbandry Building.* Assistant Professor HARPER.

History, characteristics of breeds, selection, judging, feeding, care, training and development.

**35. Mechanics of the Horse.** Must be preceded by course 34. Second half-year. Credit, three hours. Lectures and recitations, T., Th., 11. Practice, M., 10-1. *Animal Husbandry Building.* Assistant Professor HARPER.

Lectures on animal mechanics, animal proportions and the relation of the latter to specific uses. Practice in measuring animals and testing the value of given measurements for given purposes.

**36. Advanced Stock Judging.** Must be preceded by course 31. Credit, one hour. S., 10-12. *Animal Husbandry Building.* Professor WING, Assistant Professor HARPER and Mr. SAVAGE.

Practice in scoring animals, including critical descriptions of animal form.

**37. Advanced Course in the Principles of Breeding Animals.** Must be preceded by course 31. Credit, one to three hours. Th., 11. *Animal Husbandry Building.* Professor WING and Assistant Professor HARPER.

Lectures, conferences and reports, including statistical methods as applied to breeding animals. The work of the first term will consist largely of practice in making reports on statistical problems. The work of the second term will be largely individual and will afford opportunity for intimate and close study of the various breeds of improved stock.

**38. Advanced Course in the Principles of Feeding.** Must be preceded by course 31. Will not be given unless elected by at least five students. Lectures and reports. First half-year. Credit, two hours. T., Th., 9. *Animal Husbandry Building.* Professor WING and Mr. SAVAGE.

**39. Animal Husbandry.** Special course for students in the New York State Veterinary College. Not open to students in the College of Agriculture. Second half-year. Credit, three hours. T., Th., S., 9. Practice, W., 11 to 1. *Animal Husbandry Building.* Professor WING, Assistant Professor HARPER and Mr. SAVAGE.

The principles of breeding and feeding animals, with the history of improved breeds and practicums in compounding rations and stock judging.

The following excursions and inspection trips are scheduled for the year 1909-10:

To the International Live Stock Show at Chicago immediately after Thanksgiving.

To the breeders and herds in the vicinity of Syracuse immediately preceding the Easter vacation.

To the Stock Yards and Slaughter Houses in Buffalo and to breeders in the vicinity some time in May.

All of these excursions are elective.

### Poultry Husbandry.

**37. Poultry Husbandry.** Must be accompanied by course 38. Credit, three hours. M., W., F., 9. Throughout the year. *Lecture Room, Dairy Building.* Professor RICE and Assistant Professor ROGERS. Lectures, text-book study, and recitations.

Professor RICE: General considerations; kinds of poultry farming; poultry farm management; poultry feeds; feeding for egg production, fattening and rearing; marketing poultry products; principles of poultry breeding; incubators and incubation and brooding.

Assistant Professor ROGERS: Origin, history, and classification of the breeds of domestic poultry; judging for fancy and utility; principles of poultry house construction; caponizing; brooders; poultry diseases, and parasites.

**38. Laboratory Practice.** Must accompany course 37. Credit, one hour. M., T., or W. afternoon, 2 to 4:30. *Poultry Laboratory, Dairy Building, or Poultry Plant.* Professor RICE, Assistant Professor ROGERS and Mr. JACOBY. Two short excursions required May 14 and 21.

Professor RICE: Study of poultry feeds; study of the egg; anatomy of poultry; selecting breeding flocks; study of incubators; killing, picking, grading and packing poultry; marketing poultry products; poultry farm management; judging dressed poultry and eggs; poultry farm accounts.

Assistant Professor ROGERS: Construction of poultry houses; scoring and judging fancy and utility poultry; poultry sanitation; caponizing.

**39. Feeding and Management Practice.** Must accompany or follow course 37. Credit, one hour. First half-year to December 1st, and second half-year after March 1st, morning, noon, and afternoon, 1½ hours each day for 4 weeks. *Poultry Plant.* Mr. KRUM and Mr. MOIR. Managing and keeping records of a flock of fowls for egg production and for fattening, including the care and sale of eggs, etc.

**40. Incubator and Brooder Practice.** Must accompany or follow course 37. Second half-year after March 1st. Credit, one hour. Morning, noon and afternoon. 1½ hours each day for 4 weeks by appointment. *Poultry Building.* Professor RICE and

Mr. MOIR. Operating incubators or brooders and keeping the records for 4 weeks, including the taking apart and setting up of machines, drawing plans, etc.

41. **Seminary.** Open only to those who have had courses 37 and 38. Credit, one or more hours. By appointment. *Poultry Laboratory, Dairy Building.* Professor RICE, Assistant Professor ROGERS, Miss NIXON, Mr. KRUM, Mr. LYON, Mr. MOIR and Mr. JACOBY.

For advanced study and conference. Includes systematic reading and written reports by each student.

42. **Research.** Open only to those who have had courses 37 and 38. Credit, one or more hours. By appointment. *Office or Poultry Laboratory, Dairy Building.* Professor RICE and Assistant Professor ROGERS.

Includes lectures on Experiment Station methods and the conducting of an original investigation of a problem in poultry husbandry, to be presented in a written thesis by each student.

### Dairy Industry.

40. **Milk Composition and Tests.** Credit, two hours. Lectures and text-book, first half-year, T., 11. Repeated second half-year, Th., 11. Laboratory practice, one period each week. First half-year, either W. or Th.; 2 to 4:30 in October and November; 3:30 to 5:45 in December and January; or S., 8 to 10:30 through the term. Second half-year, M., 8 to 10:30 or 2 to 4:30. *Dairy Building.* Professor STOCKING and Assistant Professor ROSS.

The topics considered are secretion and composition, contamination and fermentation, lactometer, Babcock fat test, acid tests, fermentation tests, preservative tests.

41. **Creamery Methods.** Must be preceded or accompanied by course 40. Credit, three hours. Lectures and text-book, first half-year, Th., 11. Repeated second half-year, F., 11. Practice, one period each week by appointment. Each practice exercise will require five hours. \*While both farm dairying and factory methods will receive attention in each half-year, farm dairying will receive most attention in the first half-year and factory methods in the second half-year. Those desiring to become thoroughly proficient in butter-making are advised to take this course in one term, and continue the practice work in the succeeding term, making a total of five hours credit. *Dairy Building.* Mr. GUTHRIE.

This course considers the principles and practice of butter-making in farm dairies and butter factories; cream separation,



pasteurization, starters, churning, marketing, etc.; uses of skimmed milk; apparatus and buildings; creamery records.

42. **Cheese-making.** Must be preceded or accompanied by course 40. First half-year. Credit, three hours. Lectures and text-book. F., 11. Practice by appointment. Each exercise will require four to six hours, but the total hours will not exceed the equivalent of two periods or five hours per week. *Dairy Building.* Assistant Professor PUBLOW.

In this course are considered the principles and practices of cheddar cheese-making; apparatus and buildings; factory book-keeping.

43. **Market Milk and Milk Inspection.** Must be preceded or accompanied by course 40. Second half-year. Credit, two hours. Lectures, W., 11. Practice, S., 8 to 10:30 or 10:30 to 1. *Dairy Building.* Professor STOCKING and Assistant Professor ROSS.

Attention is given to the production and control of market milk, with special reference to its improvement; milk as food; shipping stations; transportation and sale; pasteurizing; standardizing; certified milk; milk laws; duties of milk inspectors; apparatus and buildings. The practice includes also visiting dairies in the vicinity of Ithaca; a short inspection trip in the neighboring counties may be arranged.

44. **Laboratory Bacteriology.** First half-year. Credit, three hours. Lectures will be given in connection with the laboratory practice. Practice, M., W., F., 2 to 4:30. *Dairy Building.* Professor STOCKING and Miss JENKINS.

The purpose of this course is to familiarize the student with laboratory methods; preparation of culture-media; sterilization; methods of studying bacteria; morphology and cultural characteristics of bacteria.

45. **Seminar.** Credit, one hour. T., 12. *Dairy Building.* Professor STOCKING, Assistant Professors PUBLOW and ROSS, Mr. AYRES and Mr. GUTHRIE.

This course is for advanced students and is required of graduate students taking work in Dairy Industry.

46. **Investigations.** Credits and assignments as arranged. *Dairy Building.* Professor STOCKING, Assistant Professors PUBLOW and ROSS and Mr. AYRES.

Special problems for advanced students.

47. **Dairy Mechanics.** First half-year. Credit, two hours. Lectures, T., 8. Practice, T., 9 to 11:30 or Th. or F., 8 to 10:30. *Dairy Building.* Mr. AYRES.



Attention is given to the care and operation of the boiler, the steam engine and the gasoline engine; installing shafting, pulleys and belts; soldering; pipe-fitting; the adjustment of separators.

48. **Fancy Cheese-making.** Must be preceded by courses 40 and 42. Second half-year. Credit, two hours. Practice by appointment. Each exercise will require two to six hours, and the total hours will be the equivalent of five hours per week. *Dairy Building.* Professor STOCKING and Assistant Professor PUBLOW and Mr. COOK.

The manufacture of certain brands of fancy cheese is given attention.

49. **Dairy Bacteriology.** Must be preceded or accompanied by course 40, and preceded by course 44 or its equivalent. Second half-year. Credit, four hours. Lecture, M., 11. Practice, M., W., F., 2 to 4:30. *Dairy Building.* Professor STOCKING and Miss JENKINS.

This course deals with the sources of milk bacteria and methods of controlling their growth; bacteriological studies of market milk and other dairy products; different species of dairy bacteria; making of starters; effect of straining, separation, pasteurization and temperature; bacteriological methods of city milk inspection.

50. **Advanced Testing Laboratory Course.** Must be preceded by course 40. Not open to first year men except by special arrangement. Second half-year. Credit, two hours. Practice, T., and Th.: in February, 3:30 to 5:45; after March 1st, 2 to 4:30. *Dairy Building.* Assistant Professor ROSS.

This course includes work in such topics as the determination of moisture and dry matter in dairy products; commercial tests for casein; different tests for butter fat; commercial tests for butter and oleo; preservatives and adulterations; milk modification.

51. **Bacteriology for the Home.** Must be preceded by course 44 or its equivalent. Second half-year. Credit, three hours. Lectures will be given in connection with the laboratory practice. Practice, T., Th., 2-4:30, S., 10:30-1. *Dairy Building.* Professor STOCKING and Miss JENKINS.

This course considers the relation of bacteria to air and water, milk and other foods; canning and preserving; molds and yeasts in their relation to household problems; decay of fruits; home sanitation; garbage; sewage.

52. **General Agricultural Bacteriology.** First half-year. Credit, three hours. Lecture, T., 11. Practice, T. and Th., 2 to 4:30. *Dairy Building.* Professor STOCKING and Miss JENKINS.

The characteristics of bacteria and their place in nature. Fermentations. Bacteria in air, water and sewage; the manure heap; soil bacteria; nitrogen fixation; relation of bacteria to the dairy and its products; the preservation of farm products, including fruits, vegetables, vinegar, silage, etc.

This course is open to students who desire a general knowledge of bacteria in relation to agricultural problems, but who cannot spend time for the more thorough courses.

**53. Dairy Buildings and Equipment and Business Methods.** Must be preceded or accompanied by course 40 and any two of the following: 41, 42, 43 and 47. Second half-year. Credit, one hour. Lecture, T., 11. Problems will be assigned to be worked outside of lecture hour. *Dairy Building*. Professor STOCKING, Assistant Professors PUBLON and ROSS and Mr. AYRES and Mr. GUTHRIE.

This course will include location, plans and construction of buildings suitable for creameries, cheese factories and market milk plants; water supply and sewage disposal; equipment for special lines of dairy work; business management, including buying and selling dairy products.

### Rural Economy.

**71. Rural Economy.** Open to students who have passed in at least twenty hours of elective agricultural subjects (including, if possible, Farm Management 1), and in Political Science 51. First half-year. Credit, three hours. M., W., F., 9. *Main 193*. Professor LAUMAN.

Lectures, discussions, reading and reports on the general economic problems of agriculture.

**72. Rural Social Conditions.** Open to students who have passed in at least thirty hours of elective agricultural subjects and in Political Science 51. Second half-year. Credit, three hours. M., W., F., 9. *Main 193*. Professor LAUMAN.

Lectures, discussions, reading and reports on the social history, status and problems of the rural community.

**73. History of Agriculture.** Open to students who have passed in at least thirty hours of elective agricultural subjects. Second half-year. Credit, three hours. T., Th., S., 9. *Main 193*. Professor LAUMAN.

Lectures, reading and reports on the development of agriculture in its more important phases.

**74. Rural Economy. Advanced Course.** Must be preceded by course 71. Second half-year. Credit, three hours. T., Th., 12. *Main 195*. Professor LAUMAN.

A more fundamental and detailed study of a few economic problems of agriculture.

**75. Rural Social Conditions. Advanced Course.** Must be preceded by course 72. First half-year. Credit, three hours. T., Th., 12. *Main 195.* Professor LAUMAN.

A more fundamental and detailed study of rural social conditions.

**76. Agriculture.** Open only to first year students. First half-year. Credit, two hours. M., W., 10. *Main 193.* Professor LAUMAN.

A general survey course dealing with agriculture in its technical, economic, social and historical aspects. Designed to give the beginner a view of the whole field of agriculture.

**77. Accounting, with Special Reference to Agriculture.** An advanced course open only to students who have passed in at least twenty hours of elective agricultural subjects, including Farm Management 1. First half-year. Credit, two hours. T., Th., 10. *Main 193.* Professor LAUMAN.

Occasional lectures on the principles of accounting, discussions, and constant practice.

**78. Seminary.** For graduates, and open to seniors by special permission. At hours to be determined. *Main 195.* Professor LAUMAN.

Devoted to current literature and the study of monographs.

**79. Research.** Primarily for graduates but open to qualified seniors. At hours to be determined. *Main 195.* Professor LAUMAN.

### Drawing.

**1. Freehand Drawing.** Two hours throughout the year, by arrangement. Assistant Professor BAKER.

An elementary course for the development of graphic expression, applicable to scientific studies.

**1.a Mechanical Drawing.** First half-year. Two hours, by arrangement. Assistant Professor BAKER.

An elementary course to enable the student to make and read simple working drawings, plans, elevations, etc.

**2. Applied Drawing.** Two hours, by arrangement. One or two terms. Assistant Professor BAKER.

Personal instruction in problems of scientific drawing. Course 1 (or its equivalent) a prerequisite.

**3. Advanced Drawing.** Assistant Professor BAKER.

Instruction in charcoal, pen and ink and color. Course 1 (or its equivalent) a prerequisite.

## Rural Art.

*Not Open to Special Students.*

This is a four-year course, the first two years of which are made up of the regular work of the College of Agriculture, with the junior and senior years specialized along lines pursuant to Rural Art and Landscape Architecture. This course prepares the student better to understand the value of rural and civic improvement problems and, supplemented by one year, or more, of office training with a reputable landscape architect, fits the student to enter into the more professional field of Landscape Art.

The courses in this department are not open to students in general with the exception of courses 86, 87, 90 and 91. Graduate work is also offered.

Previous to entering upon the more specialized work of this department, commencing in the junior year, the student must have completed the requirements of the freshman and sophomore years, and in addition must offer the following: Elementary Surveying 10; Elementary Architecture 11; Dendrology 9 (1st term).

Previous to graduation the student should have completed the following courses in addition to the regular work: Economic Entomology 8; Floriculture 29b; Greenhouse Construction 23; Water Color 14; Perspective. Below is given a suggested outline of course for students to follow.

| First Year.       | First<br>half-year. | Second<br>half-year. |
|-------------------|---------------------|----------------------|
| English 1.....    | 3                   | 3                    |
| Botany 1.....     | 3                   | 1                    |
| Botany 2.....     | 0                   | 2                    |
| Chemistry 1.....  | 6                   | 0                    |
| Chemistry 85..... | 0                   | 4                    |
| Biology.....      | 3                   | 3                    |
| Drawing 1.....    | 2                   | 2                    |
| Rural Art 90..... | 0                   | 1                    |
|                   | —                   | —                    |
|                   | 17                  | 16                   |

| Second Year.    | First<br>half-year. | Second<br>half-year. |
|-----------------|---------------------|----------------------|
| Geology 1.....  | 3                   | 3                    |
| Physics 1.....  | 4                   | 0                    |
| Physics 5.....  | 0                   | 2                    |
| Physics 10..... | 2                   | 0                    |

| Second Year, cont'd.                   | First<br>half-year. | Second<br>half-year. |
|--|---------------------|----------------------|
| Physiology of Domestic Animals 21..... | 0                   | 3                    |
| Elementary Surveying 10.....           | 3                   | 0                    |
| Elementary Architecture 11.....        | 2                   | 4                    |
| Perspective.....                       | 0                   | 1                    |
| Shades and Shadows 13.....             | 1                   | 0                    |
| Dendrology 9.....                      | 3                   | 0                    |
| Water Color 14.....                    | 0                   | 2                    |
|  | <hr/>               | <hr/>                |
|  | 18                  | 15                   |

| Third Year.                | First<br>half-year. | Second<br>half-year. |
|----------------------------|---------------------|----------------------|
| Rural Art 81.....          | 2                   | 2                    |
| Rural Art 82.....          | 3                   | 3                    |
| Rural Art 83.....          | 2                   | 2                    |
| Rural Art 86.....          | 2                   | 2                    |
| Rural Art 85.....          | 2                   | 2                    |
| Entomology 3.....          | 3                   | 0                    |
| Economic Entomology 8..... | 0                   | 2                    |
| Political Science 51.....  | 3                   | 3                    |
|                            | <hr/>               | <hr/>                |
|                            | 17                  | 16                   |

| Fourth Year.                               | First<br>half-year. | Second<br>half-year. |
|--|---------------------|----------------------|
| Rural Art 84.....                          | 1                   | 1                    |
| Rural Art 87.....                          | 2                   | 2                    |
| Rural Art 88.....                          | 3                   | 3                    |
| Rural Art 89.....                          | 0                   | 1                    |
| Horticulture (Floriculture) 29b.....       | 0                   | 3                    |
| Horticulture (Greenhouse Construction) 28. | 3                   | 0                    |
| Soils 1.....                               | 0                   | 3                    |
|  | <hr/>               | <hr/>                |
|  | 9                   | 13                   |

## Suggested Choice of Electives.

|   |   |   |
|---|---|---|
| Plant Pathology 1 and 2.....                              | 3 | 3 |
| Rural Economy 71.....                                     | 3 | 0 |
| History of Architecture 10.....                           | 3 | 3 |
| Planning of Domestic Buildings 34. 5 lectures, no credit. |   |   |
| Modern Architecture 40.....                               | 0 | 2 |



|                             |   |   |
|-----------------------------|---|---|
| Pen and Ink Drawing 37..... | 2 | 0 |
| Life Class 42.....          | 2 | 2 |
| Thesis.....                 | 2 | 2 |

**81. Theory and Aesthetics of Rural Art and Landscape Design.** Credit, two hours. M., 12, T., 11. *White 33.* Assistant Professor FLEMING (Nov. to May) and Mr. BURNAP.

Lectures, text-book and conferences dealing with the principles of landscape design, and discussions on the theory in application to specific problems, such as the designing of home grounds, country estates and civic improvement questions.

**82. Landscape Design.** Elementary course. Credit, three hours. M., W., F., 2-4:30. *White Hall.* Mr. BURNAP and Mr. ———.

Work upon practical local and office problems in design, finished plans and detailed working drawing with specifications. The aim is to familiarize the student with the various types of plans as applied to different problems, and a series of competitive problems, sketch, preliminary, and final, continues throughout the year. These to be judged by a competent committee.

During or at the end of the second term, a 4-5 day trip is generally taken for the purpose of studying a variety of good examples of landscape work.

1909 and 1911. Albany to New York, Hudson River Section.

1910 and 1912. Vicinity of Philadelphia and Washington.

**83. Freehand Sketching.** Credit, two hours. Assistant Professors BAKER and FLEMING.

Sketching and rendering in various media of indoor and outdoor subjects particularly pertaining to landscape design.

**84. History of Landscape Design.** Credit, one hour. M., 10. Assistant Professor FLEMING (Nov. to May).

A study of the chronological development of the art of landscape gardening, its modifications in various countries and the influences which have affected its development. A full study of the three types of gardening—ancient, mediæval and modern, and their relation to landscape work of the present day.

**85. Landscape Engineering and Details of Construction.** Required for admission to course 89. Credit, two hours. Lecture, T., 11. Practice, T., 2 to 4:30. *White 183.* Assistant Professor FLEMING (Nov. to May) and Mr. BURNAP.

The engineering work peculiarly necessary to landscape gardening, such as the making of relief maps, contour maps, setting of grade stakes, slope stakes, making profiles, sections and finished grade designs, use of plane-table, estimates of cost of construction,

contracts and specifications, details of construction and superintendence.

**86. Organography of Plant Materials of Landscape Gardening.** Credit, two hours. Lecture, T., 10. Laboratory, Th., 2 to 4:30. Mr. BURNAP.

A comprehensive study of the ready identification at all seasons of trees, shrubs, vines and perennials (native and introduced), which are used by the landscape designer.

This is not a course of a distinctly horticultural nature but is for the purpose of familiarizing the student in landscape design with the planting material used in general landscape work. Special attention is given to the general characteristics of such material, considered as elements of outdoor art composition.

**87. Plant Materials of Landscape Gardening.** Advanced course. Course 86 is a prerequisite. Credit, two hours. Assistant Professor FLEMING (Nov. to May) and Mr. BURNAP.

A detailed study of the use, adaptation and arrangement of ornamental trees, shrubs, vines and perennials in all the phases of landscape gardening, composition of this material from an aesthetic standpoint; planting problems of the landscape architect, park commissioner and landscape gardener; planting plans, nursery lists and estimates of cost of plantings.

**88. Advanced Problems and Research in Landscape Design.** Credit, three hours, and by special arrangement additional hours by appointment. *White Hall*. Assistant Professor FLEMING, (Nov. to May), Mr. BURNAP and Mr. ———.

The more complicated problems, such as country estates, parkways and civic centers, are taken up and worked out in detail. Studies, reports, plans of arrangement, rendered studies, detailed drawings, grade designs, planting plans, total estimates of cost and a set of specifications are worked out for two major problems. Minor problems and sketch problems are required from time to time.

**89. Seminary.** Required of seniors and graduates. Second half-year. Credit, one hour. Hours to be arranged. *White 33*. Assistant Professor FLEMING.

A review of current literature and the discussion of live questions relating to various phases of landscape work, and reports on investigations.

**90. Introductory Lectures to Work in Rural Art.** Second half-year. One hour. Mr. BURNAP and occasional lectures by Assistant Professor FLEMING and other practising landscape architects. Open to freshmen.

91. **Rural Improvement.** Assistant Professor FLEMING and Mr. BURNAP. A course of six lectures without university credit, commencing after the Christmas Recess, dealing with questions of rural improvement such as will enable the farm boy to get a point of view in rural art in general, together with specific hints for working out some of his home problems. Open also to winter-course students.

### Home Economics.

For students desiring to specialize in home economics the courses of study offered by the department have been outlined to extend through four college years. Such students must report to the Department at the beginning of the freshman year.

1. **The Home.** First half-year. Credit, two hours. T., Th., 11. Miss ROSE and Miss VAN RENSSELAER.

The object of this course is to present to the student the various aspects of home economics in a way to correlate the work as a whole. The following topics will be considered: History and evolution of the home; laws governing the home life; the home in its relation to outside factors; home-making as an occupation; correlation of science in home economics.

2. **House Construction and Furnishing.** Drawing 1 must precede or accompany this course. Second half-year. Credit, three hours. M., W., F., 11. Miss VAN RENSSELAER. The lectures of this course will include a discussion of the building site; making house plans; selection and cost of building material, the study of household furnishing from decorative, sanitary and economical standpoints.

3. **Household Management.** Political Science 51 must precede or accompany this course. Credit, two hours. Hours to be arranged. Miss VAN RENSSELAER.

This course includes discussion of division of income; problems of domestic service; household accounts; cost of shelter, food, clothing and miscellanies; methods of house-keeping; equipment; marketing.

4. **Foods.** Elementary course. General Biology, or the equivalent, Chemistry 1 and 6, or the equivalent, Physics 1, Physiology 3 and Chemistry 32 must precede or accompany this course. Credit, four hours. Lectures and recitations, T., Th., 10. Laboratory, first half-year, W., F., 2-5; second half-year, T., Th., 2-5. Miss ROSE.

This course is planned as a practical basis for the understanding of dietary problems. The lectures will include a discussion of the

composition and characteristics of food-stuffs; principles of selection; methods of preparation; food preservation and adulteration; comparative nutritive and economic values; food combinations; menu making; serving. Laboratory practice will be given to apply scientific principles in food preparation.

5. **Foods.** Advanced course. Home Economics 4 prerequisite. Credit, four hours. W., F., 10. Laboratory, first half-year, T., Th., 2-5; second half-year, W., F., 2-5. Miss ROSE.

A study of methods of investigating dietary problems and of the practical means of applying scientific principles in planning family and institution dietaries; consideration of special problems of nutrition, as in infant feeding and feeding in cases of abnormal metabolism. Laboratory work will include, as far as possible, practice in planning and preparing dietaries.

6. **Special Problems.** Credit and hours, by arrangement. Miss ROSE and Miss VAN RENSSELAER. Open only to senior or graduate students in home economics.

Special facilities will be arranged for those intending to teach home economics, which will include a consideration of the logical methods of organizing and developing courses of study in home economics. Problems of original investigation will be planned for graduate students or undergraduate students who have proved themselves capable of undertaking such work.

7. **Home Economics.** General course. Credit, four hours. Lectures, M., W., F., 9. Laboratory, M., 2 to 5. Miss ROSE and Miss VAN RENSSELAER.

This course is planned to meet the needs of students not desiring special training in home economics. It will include a discussion of foods, home sanitation, decoration and household management.

8. **House Sanitation.** Bacteriology must precede or accompany this course. Credit, two hours. T., Th., 10. Miss VAN RENSSELAER. The lectures of this course will include the discussion of the sanitary condition of the site and house; heating; lighting; plumbing; the relation of bacteriology to the household in cleaning, in the preservation of foods, in disinfection, and care of the sick.

9. **Seminary.** Required of seniors. Prerequisites are Home Economics 1, 2, 3, 4, 5 and 8. Hours to be arranged. Miss ROSE and Miss VAN RENSSELAER.

### Meteorology.

103. **Meteorology and Climatology.** Second half-year. Credit, three hours. M., W., F., 10. *Main 292.* Mr. WILFORD M. WILSON.

Lectures, laboratory work and weather observations; designed to acquaint the student with the general circulation of the atmosphere;



development, movement and conditions that attend cyclones, tornadoes and special storms; practical weather forecasting from weather maps and local observations; the use of meteorological instruments; general and special climatology and its relation to agriculture.

### **Extension Teaching.**

105a. **Extension Work.** First half-year. Credit, one or two hours. Open to all classes. M. or T., 12. *Auditorium*. Assistant Professor TUCK and Mr. JONES.

Lectures and discussions on problems of university extension in agriculture. Practice in oral and written presentation of topics in agriculture, with criticism and individual appointments on the technique of public speech.

Designed to acquaint students with parliamentary practice, to encourage interest in public affairs, and to train for effective self-expression in public. A limited number of juniors and seniors will be sent out into the State to address meetings.

105b. Second half-year. M. or T., 12. *Auditorium*. Open only to those who have completed 105a, of which it is a continuation. Same instructors and sections. Students desiring to begin work second half-year should make inquiry.

The Eastman prize in public speaking, of the value of \$100 annually, donated by Mr. A. R. Eastman of Waterville, N. Y., is given for the first time in the year 1909-10. It is open to all students in the College of Agriculture. Special training will be given to competitors. The object of the prize is to develop qualities of personal leadership in rural affairs.

### **Normal Department—Nature Study.**

#### *Two-year Special Course in Nature-Study.*

This course is organized to help persons who expect to teach nature-study and country-life subjects in the public schools. Persons actually engaged in teaching and also all persons in the University who signify their intention to teach are eligible. A certificate will be given on the completion of 60 hours in the courses prescribed below, together with such other work in the College of Agriculture as may be approved by the Director.

It should be understood that the outlined two-year course does not undertake to furnish the training necessary to fit for teaching positions in the better high schools. Students intending to prepare for such work are advised to complete the regular course leading to a degree, electing the special courses of this department.



| First Year.                            | No. of<br>Course. | First<br>Half-year. | Second<br>Half-year. |
|--|-------------------|---------------------|----------------------|
| Botany .....                           | 1                 | 3                   | 1                    |
| Botany .....                           | 2                 | —                   | 2                    |
| Biology .....                          | 1                 | 3                   | 3                    |
| Entomology .....                       | 3                 | —                   | 3                    |
| Geology .....                          | 1                 | 3                   | 3                    |
| Chemistry .....                        | 185               | 3                   | —                    |
| Nature-Study .....                     | 91                | —                   | 2                    |
| Horticulture .....                     | 32                | 2                   | 2                    |
|  |                   | —                   | —                    |
|  |                   | 14                  | 16                   |
| Elective, two-thirds agriculture ..... |                   | 1-4                 | 0-2                  |

| Second Year.*                          | No. of<br>Course. | First<br>Half-year. | Second<br>Half-year. |
|--|-------------------|---------------------|----------------------|
| Vertebrate Zoology .....               | 5                 | 3                   | 3                    |
| Botany .....                           | 5                 | —                   | 2                    |
| Soils .....                            | 101               | 3                   | —                    |
| Farm Crops .....                       | 3                 | 3                   | —                    |
| Nature-Study .....                     | 93                | 1                   | —                    |
| Nature-Study .....                     | 100               | 2                   | 2                    |
|  |                   | —                   | —                    |
|  |                   | 12                  | 7                    |
| Elective, two-thirds agriculture ..... |                   | 3-6                 | 8-11                 |

91. **Nature-Study.** Open to all students. Second half-year. Credit, two hours. T., Th., 12. *Goldwin Smith.* Mrs. COMSTOCK.

Lectures on nature-study as a part of primary education, and discussion of methods of correlating the subject-matter with other school work; nature-study as a basis for elementary agriculture; a review of nature literature

93. **School Gardening.** Open to students who have had Horticulture 32. First half-year. Credit, one hour. T., 2. *Main 191.* ALICE G. McCLOSKEY.

Lectures on gardening as related to primary education; management of school gardens; discussions relating to school gardens.

100. **Nature-Study, Advanced Course.** Not open to first year students. Two hours throughout the year. T., Th., 8-10. *The Insectary.* Mrs. COMSTOCK.

Summary of the subjects found in plant and animal life which are best fitted for nature-study; practice and methods of study

\*Beginning with 1909-10, additional courses in Education may be required during the second year.

and manner of presentation, special attention being given to the relating of these subjects to agriculture. Conferences, field and laboratory work.

### **SPECIAL WORK.**

Opportunities are provided for persons who desire to pursue special work. Students must be at least eighteen years of age to take advantage of this work, and applications will be received until September 15. No non-resident of the State of New York will be accepted under the age of twenty-three, unless he can meet all requirements for entering upon the regular course.

1. **Special Work in General Agriculture.** This work is designed to meet the needs of young men and young women from the farm who have not the time to give to a four years' course. They must satisfy the College that they are well enough grounded in the secondary school subjects to enable them to pursue the work with credit to themselves and with honor to the University, and also that they desire to take the work because of direct interest in agricultural affairs. They must present an honorable dismissal from the school last attended and certificates of good moral character, and will be required to present such other certificates and letters as may be desired. This work is not a definite "course" in the sense of having a program or a prescribed set of studies. The student chooses any of the agricultural "electives" that he may be able to pursue. Certain courses are to be given by some of the departments for those who lack some of the fundamental work usually required in those subjects. Admission as a special student does not admit to classes. The student is admitted to the various classes by the heads of the departments when he has satisfied such officers that he is able to pursue the work.

2. **Nature-Study Special Course.** This course, of two years, is open to teachers, or to such students in regular University courses as signify their intention to teach, who desire to prepare themselves in nature-study and country-life subjects. In this course the work is largely prescribed. The course comprises two categories of work: the subject-matter studies, and the pedagogical work. The subject-matter is secured in the regular classes of the University, largely in the biological departments. The pedagogical training is to be had in connection with the regular nature-study courses as outlined.

### **EXTENSION WORK.**

The extension work of the College of Agriculture is designed to help persons directly on their farms, and to aid those who desire

definite instruction but cannot take a long or regular course in agriculture in the University. It supplements the teaching and experimenting of the College of Agriculture. It is professedly a popular work. It endeavors to reach the common problems of the people, to quicken the agricultural occupations, and to inspire a greater interest in country life. It is also a bureau of publicity, whereby there is an exchange of all important matters connected with the progress of the agriculture of the State.

### Winter-Courses.

The Winter-Courses now offered are five, all opening Dec. 2, 1909, and closing Feb. 23, 1910. They are:

- |                         |                  |
|-------------------------|------------------|
| 1. General Agriculture. | 2. Dairy.        |
| 3. Poultry.             | 4. Horticulture. |
| 5. Home Economics.      |                  |

A special program describing these courses will be sent on application to the New York State College of Agriculture Winter-Courses, Ithaca, N. Y.

# CORNELL UNIVERSITY

## DEPARTMENTS AND COLLEGES

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### GRADUATE SCHOOL

Degrees, A.M., etc. and Ph.D.

### COLLEGE OF ARTS AND SCIENCES

Degree, A.B.

### COLLEGE OF LAW

Degree, LL.B.

### MEDICAL COLLEGE

Degree, M.D. New York City and Ithaca.

### NEW YORK STATE VETERINARY COLLEGE

Degree, D.V.M.

### NEW YORK STATE COLLEGE OF AGRICULTURE

Degree, B. S. A.

### COLLEGE OF ARCHITECTURE

Degree, B.Arch.

### COLLEGE OF CIVIL ENGINEERING

Degree, C.E.

### SIBLEY COLLEGE OF MECHANICAL ENGINEERING AND MECHANIC ARTS

Degree, M.E.

UNIVERSITY OF ILLINOIS

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